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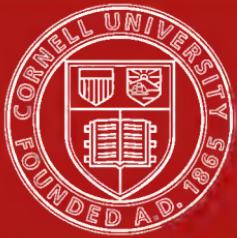
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THE SEXUAL LIFE OF WOMAN

INTRODUCTION

By the *sexual life of woman* we understand the reciprocal action between the physiological functions and pathological states of the female genital organs on the one hand and the entire female organism in its physical and mental relations on the other; and the object of this book is to give a complete account of the influence exercised by the reproductive organs, during the time of their development, their maturity, and their involution, on the life history of woman.

From the earliest days of the medical art this sexual life of woman has aroused in the leaders of medical thought the highest interest, and for this reason great attention has been directed, not only to the anatomy of the genital organs and to the diseases of the reproductive system, but also to the individual manifestations of sexual activity and to the influence exercised by these on the female organism as a whole.

Several works by Hippocrates are extant on this subject, among which may be mentioned: *περὶ Γυναικεῖης Φύσεως*,¹ a treatise on the physiology and pathology of woman; *περὶ Αφορῶν*,² which discusses sterility in women; *περὶ παρθενιῶν*,³ a treatise on the pathological states of virgins. These writings of Hippocrates con-

¹ Concerning the Feminine Constitution.

² Concerning the Barren.

³ Concerning Virgins.

tain some very remarkable observations on the influence exercised by disorders of the reproductive organs on the general health of women.

Aristotle wrote at some length on the functions of the female genital organs. In the writings of Aretæus and Galen on the diseases of women we find striking observations, as for instance, in Galen's *De Locis Affectis*,⁴ which contains a "Statement of the Similarity and Dissimilarity of Man and Woman." Another notable work is that of Albertus Magnus, entitled *De Secretis Mulierum*.⁵

The numerous works on the diseases of women published in the sixteenth century consisted for the most part of a repetition of the observations of ancient writers. The gynecological treatises of the eighteenth century, however, bore witness to an increased knowledge of the anatomy of the female reproductive organs, and were illumined by Haller's researches on the functions of these organs.

The subject with which we are especially concerned is discussed in a work by Boireau-Laffecteur, *Essai sur les Maladies Physiques et Morales des femmes*,⁶ Paris, 1793; and also in Marie-Clement's *Considérations Physiologiques sur les Diverses Epoques de la Vie des Femmes*,⁷ Paris, 1803. In the same connection we must mention von Humboldt's treatise, *Ueber den Geschlechtsunterschied und dessen Einfluss auf die organische Natur*.⁸ The first comprehensive work in which an exhaustive inquiry was made into the functional disorders of the female genital organs and the

⁴ On the Diseases of Regions.

⁵ On the Secret Parts of Women.

⁶ Essay on the Physical and Mental Diseases of Women.

⁷ Physiological Considerations on the Diverse Epochs of the Life of Woman.

⁸ Concerning Sexual Differentiation, and Its Influence on Organic Nature.

relation of these disorders to the female organism as a whole and to the physical and mental peculiarities of woman was Busch's: *Des Geschlechtsleben des Weibes*,⁹ Leipzig, 1839.

In the second half of the nineteenth century a very large number of monographs were published, investigating and describing the reflex disturbances produced alike in the individual organs and in the nervous system as a whole by changes in the uterus and its annexa. Many of these works will be mentioned more particularly in the course of this treatise.

The sexual life, based upon the purpose, so important to every creature, of the propagation of the species, possesses in the female sex a vital significance enormously greater than sexual activity possesses in the male. From the very beginning of sexuality, when the idea of a bisexual differentiation dawns for the first time in the brain of the little girl, down to the sexual death of the withered matron, who laments the loss of her sexual potency, physical and mental activity, work and thought, function and sensation, arise for the most part, wittingly or unwittingly, from that germinal energy which is the manifestation of the unalterable law that the existing organism endeavors to reproduce its kind.

Every phase of the sexual life of woman, from the threshold of puberty to the extinction of sexual activity, the first appearance of menstruation, the complete development of the sexual organs, the act of copulation, conception, pregnancy, parturition, and the puerperium, finally the involuntary process which accompanies the cessation of menstruation at the climacteric period—every one of these sexual phases entails consecutive physiological processes and pathological

⁹ The Sexual Life of Woman.

changes alike in the individual organs and in the nutritive condition of the entire organism, in the functions of the cardio-vascular apparatus, of the brain and the nerves, of the skin and the sense-organs, in the processes of digestion and general metabolism.

Just as in a tree the process of growth is made manifest to the superficial observer by the pleasure he feels at the sight of the buds and blossoms, by the refreshment he obtains from the fruit, and by the sadness which the withering of the leaves causes him, so in the sexual life of woman there are landmarks which no one can possibly overlook, by means of which three great epochs are distinguished. These are: puberty (the menarche), recognized by the first appearance of menstruation and the awakening of the sexual impulse; sexual maturity (the menacme), in the fully developed woman, characterized by the functions of copulation and reproduction; and sexual involution (the meno-pause), in which we see the gradual decline and ultimate extinction of sexual power and all its manifestations. In all these three epochs the sexual life of woman not only affects the hidden domain of the genital organs, but controls also all the vegetative, physical, and mental processes of the body, and is clearly and incontestably apparent in all vital manifestations. What Madame de Staël said of love is indeed true of the entire sexual life of woman: *l'amour n'est qu'une épisode de la vie de l'homme; c'est l'histoire tout entière de la femme.*¹⁰

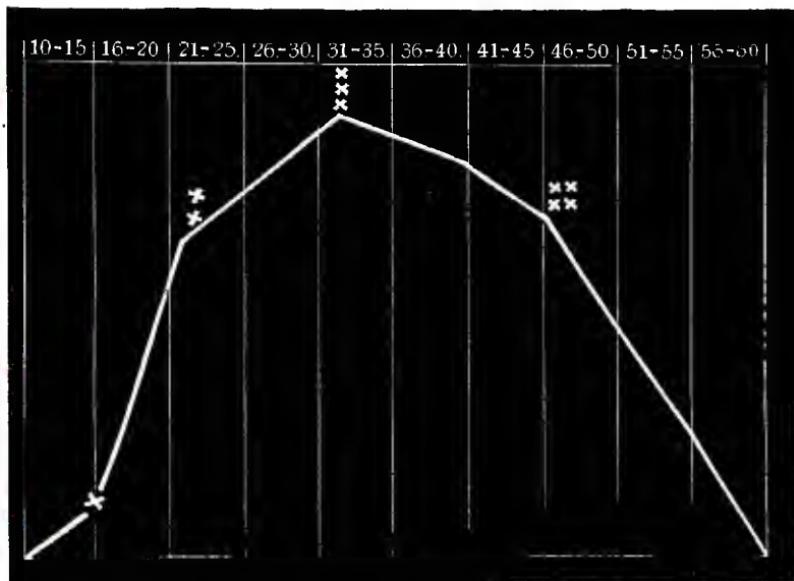
The sexual life of woman is coëxcessive with the peculiar vital activity of the female sex, for it endures

¹⁰ "Love is an episode merely in the life of man; of woman, it is the entire history." But this epigram of Madame de Staël's will, to English readers, be more familiar in the form in which it was cast by Byron (*Don Juan*, canto i, stanza 194):

"Man's love is of man's life a thing apart;
'Tis woman's whole existence."

from the moment when individuality first begins to develop out of the indifferent stage of childhood until the decline into the dead-level of senility.

To illustrate this fact, I have drawn up a curve of the sexual life of woman, making use of the statistical data available in central Europe regarding the age at which menstruation first appears, the age at which maidens marry, the age at which the largest number



Curve of the sexual life of woman from the tenth to the sixtieth year of life.

of women give birth to a child, and the age at which menstruation ceases; and reducing the figures to averages. * denotes the fifteenth year of life, as the average age at the menarche; ** denotes the twenty-second year of life as the average age at marriage; *** denotes the thirty-second year of life, in which woman exhibits her maximum fecundity; **** denotes the forty-sixth year of life as the average age at the menopause.

Not in this respect alone, however, is the sexual life

of woman of paramount importance; it is, in addition, the mainspring of the well-being and progress of the family, of the nation, of the entire human race. In the evolution of man from the primitive state in which he existed merely for the performance of vegetative functions up to the highest stage of contemporary culture, in the history of all races and of all times, the sexual life has been a most potent determining factor. With that life, religion, philosophy, ethics, natural science, and hygiene, have been most intimately related; for that life, they have furnished precepts and laws. The history of the sexual life is identical with the history of human culture.

In a primitive condition of society, among people living in a state of nature and among the lower races of mankind, the sexual life of woman possesses no great general interest, the female being merely a chattel; the ownership of this chattel, moreover, being often temporary and transient. The investigations of anthropologists have shown that among primitive people this form of property is neither highly esteemed nor carefully safeguarded. In such societies no restraint is imposed on the sexual impulse, which is gratified without shame and without formality. No hindrance is offered to the mutual intercourse of the two sexes. Chastity in the females is not prized by the males, nor do the latter compete for the favors of the former. Procreation is no more than a gregarious impulse of the masses among whom the common ownership of all booty is a matter of tribal custom. The woman has no disposing power over that which every one desires and which every one has the right to demand. Very gradually, however, a change takes place in this respect, so that in every period of social life since the very earliest, the modesty of young girls, the high valuation put upon the

preservation of virginity, the ethical approbation of chastity in the wife, respect for the duties and rights of the mother, the reverence felt for the matron—all these, throughout the sexual life of woman, have had a civilizing, ennobling, and elevating effect. Thus, as family life has become developed, and as love and marriage have been more highly esteemed, woman has become the much-prized embodiment of all that is beautiful and good, of all that is summed up in the idea of the “housewife,” and her sexual life has been more completely, more ideally admired. The danger is not remote, however, that the levelling tendencies of the present day, and an inclination to despise the sexual life of woman, far from resulting in a further elevation of the social status of womanhood, will result rather in its abasement.

The Bible, as we may expect from the patriarchal relationships of the women of that time, bears witness to the worth of woman, and, whilst esteeming child-bearing, refers to yet higher duties. Precise religious and social precepts are furnished for all the phases of sexual life.

In classical antiquity, also, we see that woman rose to some extent above the low position she had previously occupied in the family circle and in society at large. Both among the Greeks and among the Romans, there was open to women a more intimate place in social life and a more influential rôle in the life of the family, than would have been their portion regarded merely in relation to their childbearing activity. Amongst the Germans in the very earliest times, chastity gave rise to purer and more moral sexual relations; whereas among the Slavonic peoples the conception of woman as the childbearer continued to dominate these relations.

In consequence of the diffusion of Christianity, woman became man's companion and equal, and her life, the sexual life included, acquired a deeper significance, owing to the stress which that religion laid on chastity as a virtue, and as a result of the educational influence of woman in the family circle.

With the progress of civilization the sexual life of woman comes to exhibit its activities only within the bounds of morality and law, which in human society have replaced the crude rule of nature, and have supplied regulations adapted to the changing phases of sexual vital manifestations. The wise adaptation of these regulations requires, however, a full understanding of the mental and physical processes, an exact recognition of the bodily states and intellectual sensibilities of woman regarded as a sexual being.

Modern culture and the social organization of the present day, in association with the resulting sexual neuropathy of women, have exercised on their sexual life an influence as powerful as it is unfavorable, manifesting itself in the overpowering frequency of the diseases of women. In one of the most thoughtful books ever written on the subject of woman, Michelet's *L'Amour*,¹¹ the author remarks that every century is characterized by the prevalence of certain diseases; thus, in the thirteenth century, leprosy was the dominant disease; the fourteenth century was devastated by bubonic plague, then known as the black death; the sixteenth century witnessed the appearance of syphilis; finally, as regards the nineteenth century, "*se siècle sera nommé celui des maladies de la matrice.*"¹² It is certain that the education and mode of life of the modern woman belonging

¹¹ On Love.

¹² "This century will be known as the century of the diseases of the uterus."

to the so-called upper classes are, as far as sexual matters are concerned, in direct opposition to those that are agreeable to nature and those that the laws of health demand.

Even before sexual development begins, before the physical ripening of the reproductive organs to functional activity, the imagination of young girls is often prematurely occupied with sexual ideas in consequence of unsuitable literature, owing to visits to theatres and exhibitions, or on account of social intercourse with young men who are not overscrupulous in the selection of topics for conversation. From the time of puberty up to the time of marriage the growing woman is under the influence of the now awakened sexual impulse, which experiences ever-renewed stimulation. A sedentary mode of life, unsuitable nutriment, and the early enjoyment of alcoholic beverages, exhibit their inevitable result in the frequency with which, in this epoch of the sexual life, chlorotic blood-changes, neurasthenic conditions, and divers symptoms of irritation of the genital organs, make their appearance. Thus, when marriage, so often unduly postponed in consequence of the condition of modern society, does at length take place, it is apt to find the woman not only fully enlightened as regards sexual matters, but often in a state of nervous weakness from sexual stimulation, one of the type whose characteristics have been happily summed up by the French writer Prévost in the expression *demi-verge*.¹⁸ The conjunction of this state of affairs in the bride with the frequent partial impotence of the bridegroom, who has already dissipated the greater part of his virile power before entering upon marriage, leads often to the appearance of vaginismus and other sexual neuroses in young married women. Even

¹⁸ Half-virgin.

more disastrous in its consequences as regards the future sexual life of the wife is the ever-increasing frequency of gonorrhœal infection in the first days of marital intercourse, with all the evil results of that infection.

On the other hand, an ever-larger proportion of girls belonging to the "middle and upper classes," abstaining alike from the good and the evil results of marriage, falls under the yoke of sexual impulses denied satisfaction or gratified by abnormal means, and suffers in consequence both physically and mentally. Further sources of injury arising from the conditions of modern social life are to be found in the neglect by women of the well-to-do classes of the duty of suckling their children, and in the ever-increasing frequency with which the women of these classes, after giving birth to one or two children, resort to the use of measures for the prevention of pregnancy, which result in serious consequences as regards both the nervous system and the genital organs of the women concerned. Thus there comes an accelerated ebb in the sexual life, leading to a premature appearance of the general phenomena of senility, with a cessation of the menstrual flow. The modern wife, who claims the right to lead the life that best pleases her, will be more rapidly overtaken by sexual death.

The psychical influences which proceed from the female genital organs in the different periods of sexual life have great significance for the organism as a whole. Manifold impulses, both stimulating and depressing, arising in the reproductive organs affect the workings of the mind. The maiden at puberty is affected by the knowledge of sexuality; the sexually mature woman, by the desire for sexual satisfaction, and by the yearning for motherhood; the wife, by the processes of pregnancy, parturition, and suckling, or, on the other

hand by the distressing consciousness of sterility; the woman at the climacteric period, by the knowledge of the disappearance of her sexual potency. The mind is further sympathetically influenced by the stimulation of the terminals of the sensory nerves in the genital organs. Through the increase of such stimulation, through its spread to adjacent nerves and nerve tracts and to the entire nervous system, the mind is affected, directly by irradiation, or indirectly by vasomotor processes and spinal hyperæsthesia.

Psychical manifestations and the nervous states associated with these are somewhat frequently, and even actual psychoses occasionally, encountered in the various phases of the sexual life of woman, sometimes taking the form of violent sexual storms, which may indeed, as ordinary menstrual reflexes, accompany every catamenial period.

Of great interest are the facts which have, in recent times especially, been scientifically established, pointing to a certain periodicity, to an undulatory movement of the general bodily functions of the female organism, dependent upon the sexual life. The observations of Goodman, Jacobi, von Ott, Rabuteau, Reinl and Schichareff, have shown that in woman the principal vital processes pursue a cycle made up of stages of increased and diminished intensity, and that this periodicity of the chief general processes of vital activity finds expression also in the functions of the reproductive organs. Goodman has compared this play of general vital functions to an undulatory movement. According to this writer, a woman's life is passed in stages, each of which corresponds in duration with a single menstrual cycle. Each of these stages exhibits two distinct halves, in which the vital processes are respectively ebbing and flowing: in the latter we see an increase of all vital

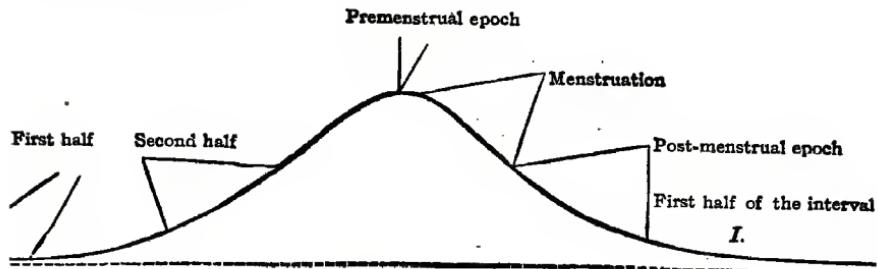
processes, a larger heat of production, a rise in blood-pressure, and an increased excretion of urea; in the former we see, on the contrary, that all these vital processes display a diminished intensity. The moment when the period of increased vital activity is at an end, the moment when the ebb begins, corresponds, according to Goodman, to the commencement of the catamenial discharge.

Goodman sought for verification of this undulatory theory of the sexual life of woman in certain data regarding the bodily temperature and the blood-pressure. A more extensive research was undertaken by Jacobi, who, as the result of her observations, came to the following conclusions. In eight cases she noticed in the premenstrual epoch a rise of temperature ranging from 0.05° C. to 0.44° C. (0.09° F. to 0.79° F.); and during the catamenial discharge a gradual fall of 0.039° C. to 0.25° C. (0.072° F. to 0.45° F.), never less, that is to say, than a quarter of a degree Centigrade; but in the majority of cases the temperature did not, while the catamenia lasted, regain the normal mean. She further observed in the generality of cases an increased excretion of urea during the premenstrual epoch; and a notable fall in blood-pressure during menstruation.

Reinl's observations on healthy women, in whom menstruation ran a normal course, showed that in the great majority of cases in the premenstrual epoch the temperature was elevated as compared with that of the interval, that in eleven out of twelve cases the temperature gradually declined during menstruation, to fall in three-fourths of the cases below the mean temperature of the entire interval, and exhibiting in the postmenstrual epoch a still further depression, giving place, however, to a somewhat higher mean temperature during the first half of the interval. In the second half

of the interval a higher mean temperature was observed than in the first half.

If we make a graphic representation of the mean differences in temperature commonly observed throughout the various stages of an entire menstrual cycle, we see that the curve does in fact take the form of a wave. That drawn by Reinl is shown in the following figure:



The rising portion of the wave, the beginning of the tidal flow, corresponds to the second half of the interval; the height of the tidal flow, the crest of the wave, corresponds to the premenstrual epoch. As the flow gives place to the ebb, as the wave begins to decline, we come to the actual period of the catamenial discharge; later in the ebb is the post-menstrual epoch, and the lowest portion of the declining wave corresponds to the first half of the interval. Rhythmic changes corresponding to those observed in the temperature have been recorded—at least in isolated stages of the menstrual cycle—affecting the blood-pressure by Jacobi and by von Ott, affecting the excretion of urea by Jacobi and by Rabuteau, and affecting the pulse by Hennig. It is evident that the vital activity of the organism attains its maximum shortly before menstruation; and that with or immediately before the appearance of the catamenial discharge, a decline of that activity commences.

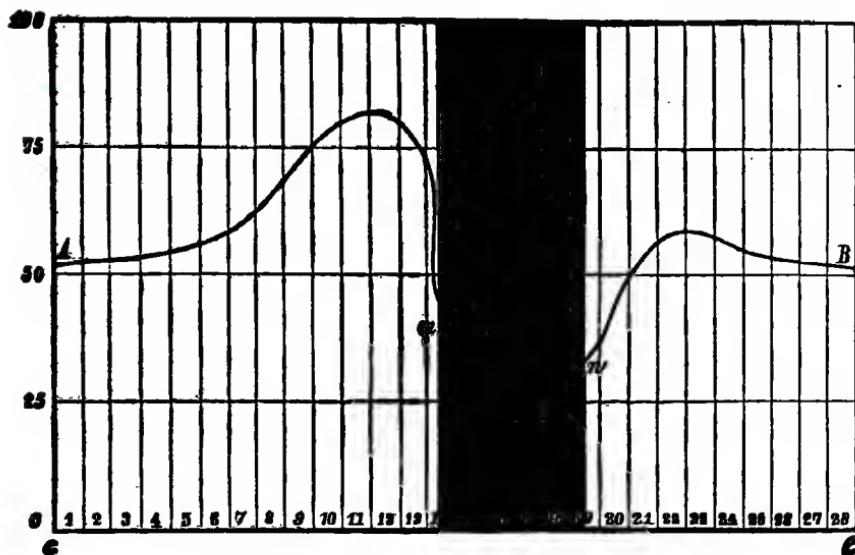
Schrader, through his researches on metabolism during menstruation in relation to the condition of the bodily functions during this process, has established that immediately before menstruation the elimination of nitrogen in the faeces and the urine is at its lowest, a fact which indicates that at this period of the menstrual cycle the disintegration of albumin in the body is notably diminished.

Von Ott found in thirteen cases out of fourteen that at the beginning of the catamenial discharge, or just before a considerable fall in blood-pressure occurred, and that throughout the flow the pressure almost always remained below the mean, no rise taking place till menstruation was finished; this fall in blood-pressure during menstruation was more considerable than could be accounted for by the moderate haemorrhage. The same author, in conjunction with Schichareff, examined fifty-seven healthy women in respect of heat-radiation, muscular power, respiratory capacity, expiratory and inspiratory power, and tendon-reflexes.

He found that the energy of the functions of the female body increased before the beginning of menstruation, but declined with or immediately before the appearance of the catamenial discharge. He exhibited this rhythmical variation in the vital processes by means of the following curve, in which the line *AB* represents these physiological variations, whilst on the abscissa line *ce*, the days of observation are recorded, and the interval *mn* represents the menstrual period. The degree of intensity of the united functions is indicated by the numbers 0—100 on the ordinate.

Still another point of view from which the influences affecting the female organism as a whole may be regarded has very recently become apparent in consequence of the doctrine of Brown-Séquard relating to

the internal secretions of ductless glands. As regards the female reproductive glands, which in consequence of their structure must be referred to the group of ductless glands, and yet owing to their secretory function must be classed among secreting glands (so that the nature of the ovary is that of a secreting gland without an excretory duct), it would appear that these



glands are not concerned only with the specific female reproductive functions of menstruation and ovulation, but that they also exercise a powerful influence on the nutritive processes, on metabolism and haematopoiesis, and on growth and development in their mental as well as their physical relations.

It is supposed that these glands under normal conditions enrich the blood with certain substances, which in part assist in haematopoiesis, and in part by regulating the vascular tone in the various organs are concerned in the normal processes of assimilation and general metabolism. According to Etienne and De-

mange, ovariin possesses an oxidizing power similar to that possessed by spermin. Thus it becomes easy to understand how disturbances in the functions of the ovaries give rise to disturbances in the processes of general metabolism and of assimilation. Some go even farther, though in doing so they leave the ground of assured fact, suggesting that the ovary in certain circumstances produces toxins, or that the normal ovary possesses an antitoxic function, and speaking of an occasional ovarian auto-intoxication of the body or of a menstrual intoxication. Thus, chlorosis is by some regarded as a disturbance of haemopoiesis, dependent on an abnormal condition of the female reproductive organs during the period of development, and referable to a disturbance of the internal secretion of the ovaries (Charrin, von Noorden, Salmon, Etienne, and Demange). And it is now generally assumed, the assumption being based on the observations recently made concerning the organo-therapeutic employment of the chemical constituents of the ovary, that many of the disorders, and especially those connected with the vaso-motor system, common during the climacteric period, are dependent on the deficiency of the products of the internal secretion of the ovary that accompanies the cessation of the menses.

The undulatory movement of the vital processes in woman is apparently in some way dependent on ovulation, though the nature of the connection has not hitherto been fully elucidated. This view is confirmed by the fact that no such rhythmic variation in the bodily functions can be detected either in girls under thirteen years of age, or in women from fifty-eight to eighty years of age in whom menstrual activity has entirely disappeared. The menstrual rhythm begins at puberty and ends when ovulation ceases.

A further contribution to the doctrine of the undulatory movement of the vital processes in woman is to be found in my own observations that pathological symptoms which have become manifest before and at the time of the first onset of menstruation, and have given but little trouble throughout the period of developed and regular sexual activity, are apt when menstruation ceases to recrudesce, and to become as prominent as they were at the commencement of the sexual life.

Women who at the time of puberty suffered from cardiac troubles, from digestive disturbances, or from various forms of nervous irritation, and in whom as they grew up these disorders passed more or less into abeyance, are apt at the climacteric period to exhibit, as I have frequently been able to observe, a violent return of these symptoms, in the form, as the case may be, of tachycardia, of dyspeptic troubles, or of psychoneuroses. In this connection we may mention an observation of Potain's, who distinguishes a peculiar form of chlorosis, occurring in individuals of delicate constitution, which, though apparently cured, reappears at the menopause.

Related to the sexual life of woman is another attribute, one intimately connected with the idea of the female sex, and one which since the primeval days of humanity has filled men with delight and poets with inspiration—the attribute of beauty.

The beauty of woman, a prominent secondary sexual character, makes its first appearance at puberty, when the girl's form, hitherto undifferentiated in its external bodily configuration, begins to assume a soft and rounded appearance, when the features become regular, the breasts enlarge, and the pubic hair begins to grow—when, in short, to the primary sexual char-

acters already existing, the secondary sexual characters are superadded.

Feminine beauty continues to increase until the attainment of sexual maturity. In her third decade woman arrives at the acme of her sexual life and at the same time attains the perfection of her beauty.

The ensuing sexual phases, pregnancy, parturition, and lactation, entail a decline in beauty, not rapid indeed, but advancing gradually, with the slow yet sure-footed pace of time. The organic revolutions accompanying these processes leave traces recorded upon the surface of the body in conspicuous and indelible characters. The illnesses, also, which so often accompany the fulfilment of sexual functions in injuring health impair also beauty.

A woman who has given birth to and nursed an infant begins to lay on fat, and this tendency to obesity becomes more pronounced as the climacteric period approaches. The breasts become inelastic and pendent, the abdomen becomes ungracefully prominent; the tonicity of the entire organism gradually declines, and, in consequence of the loss of elasticity in the subcutaneous cellular tissue, the dreaded wrinkles make their appearance and the features become wizened. Beauty is a thing of the past. With the cessation of the sexual life the external secondary sexual characters disappear, and the old woman is even farther removed than the old man from our conception of beauty.

As Mantegazza insists, the beauties peculiar to women are one and all sexual; they depend, that is to say, upon the peculiar functions that nature has allotted to woman in the great mystery of procreation. One of the most vivid and poetical descriptions in ancient or modern literature of these secondary sexual char-

acters on which feminine beauty depends is to be found in the Song of Solomon.

"Behold, thou art fair, my love; behold, thou art fair; thou hast doves' eyes within thy locks: thy hair is as a flock of goats, that appear from Mount Gilead.

"Thy teeth are like a flock of sheep that are even shorn, which come up from the washing; whereof every one bear twins, and none is barren among them.

"Thy lips are like a thread of scarlet, and thy speech is comely: thy temples are like a piece of a pomegranate within thy locks.

"Thy neck is like the tower of David builded for an armory, whereon there hang a thousand bucklers, all shields of mighty men.

"Thy two breasts are like two young roes that are twins, which feed among the lilies."

"How beautiful are thy feet with shoes, O prince's daughter! the joints of thy thighs are like jewels, the work of the hands of a cunning workman.

"Thy navel is like a round goblet, which wanteth not liquor; thy belly is like an heap of wheat set about with lilies.

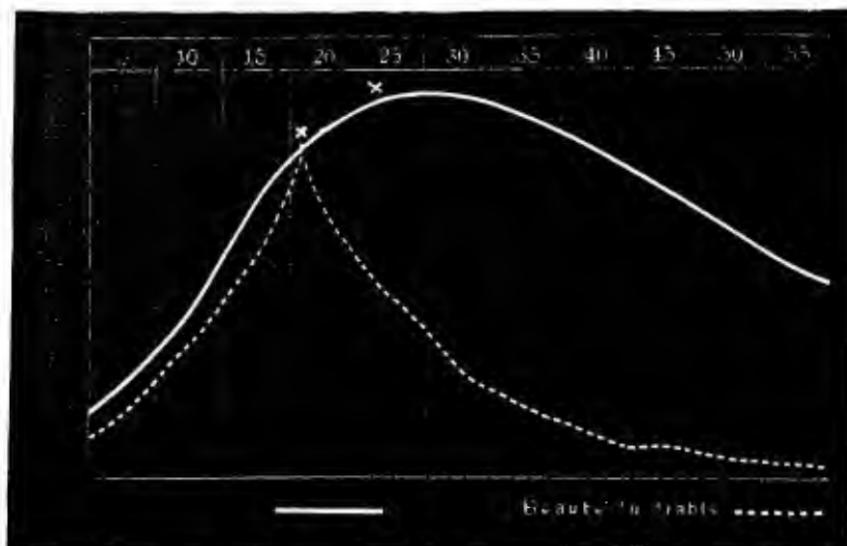
"Thine head upon thee is like Carmel, and the hair of thine head like purple."

"This thy stature is like to a palm tree, and thy breasts to clusters of grapes."

In the following figure the curve of beauty of woman is given as drawn up by Stratz. In one case it may rise very quickly, to decline with equal quickness—the so-called *beauté du diable*,¹⁴ in other cases, again, the curve rises very slowly, and declines also very slowly, the culmination of the curve being in this case attained later, and when attained being absolutely higher, than in the case of the steeper curve.

¹⁴ Beauty of the devil.

The age at which the maximum of beauty is attained is a very variable one. In the southern races this often occurs as early as the fourteenth or fifteenth year of life; but in the peoples of the Teutonic stock, Germans, Dutch, Scandinavians, and English, not as a rule before the twentieth year, and it may be even later. Stratz has known cases in which women did not attain the



prime of their beauty until the thirtieth and even the thirty-third year. The same author, a most competent authority as regards the subject of feminine beauty, affirms that a beautiful woman is most beautiful when the period of maximum beauty coincides in her case with the first month of her first pregnancy. With the commencement of pregnancy the processes of nutrition are accelerated, all the tissues are tensely filled, the skin is more delicately and at the same time more brightly tinted owing to the greater activity of the circulation, the breasts become firmer and more elastic. Thus the attractive characteristics of beauty at its fullest ma-

turity become enhanced, but for a short time only, since the enlargement of the abdomen in the further course of pregnancy impairs the harmony of the figure. Finally we must point out, before dismissing this subject, that women of the so-called better classes arrive, as a rule, at maturity later, and remain beautiful for a longer period, than women of the working classes.

The degree to which the female organism as a whole is influenced by the processes of the sexual life that occur in the genital organ depends upon many of the characteristics that combine to make up the individuality. Inherited characteristics, temperament, and race, play a great part in this connection; and not less important than these are the social conditions, the environment, in which the women under consideration pass their life. Thus, among women belonging to the poorer, laboring classes, the reflex manifestations in other organs dependent upon the processes of the genital organs are less frequent and less intense than among women belonging to the well-to-do strata of society and to the cultured classes; less also in the country than in large towns. In phlegmatic individuals, such manifestations exhibit less intensity than in those of an active, ardent temperament; they are less frequent in persons with a powerful constitution than in those endowed by inheritance with an unstable nervous system. Finally, they are less often encountered among families whose upbringing has aimed at hardening the constitution and at inculcating the control of instinctive impulses, than among those in whom from early childhood sensibility and impulsiveness have been given a loose rein.

Extremely variable also are the sympathetic disturbances and morbid states which depend on the processes of the sexual life of woman. "Le cri de l'organe

souffrant ne vient pas de l'utérus mais de tout l'organisme,"¹⁵ says Courty. And a large number of isolated observations has shown how complex are the relations between the healthy and unhealthy female genital organs and the other organs of the body as well as the organism as a whole. Precise and incontestable proofs exist of such relations between the female genital organs and morbid changes in the eye and ear, the skin, the respiratory organs, and the vascular and nervous systems.

The influence exercised by the reproductive system on the general vital processes of woman is indicated also by the general statistics of mortality and the incidence of disease. Mortality in women, the earliest years of childhood being left out of consideration, is at its highest precisely during the great sexual epochs, namely at the time of puberty, during pregnancy, during the puerperium, and at the climacteric period. The complete performance of the reproductive functions entails a higher proportion of illnesses and death; and statistical records show that the mortality of married women between twenty and forty years of age, during the period, that is to say, in which in consequence of marriage they fulfil the duties of sexual intercourse and procreation, and are exposed to the dangers connected with these sexual acts, is much higher than the mortality of unmarried women of corresponding ages. Infection with the gonococcus and with the virus of syphilis, chronic salpingitis, metritis, and parametritis, the manifold diseases of pregnancy, the diseases of the puerperium, the various displacements of the uterus, osteomalacia—all these are pathological states the dependence of which upon the sexual life

¹⁵ "The cry of the suffering organ comes not from the uterus but from the entire organism."

of the married or at any rate sexually active woman is indisputable. But the complete renunciation of sexual activity appears also to exercise an injurious influence on the health, and to give rise or at least predispose to morbid manifestations. Hysteria, for instance, chlorosis, uterine myomata, and various neuroses, have long been supposed to depend in part upon such renunciation, though the causal connection cannot be regarded as yet fully established.

Especially true as regards woman, indeed, is that which Ribbing says concerning the sexual life in general: "Since all human life and being has its origin in sexual relations, these sexual relations may be regarded as the heart of humanity. We may work day and night for the good of humanity, we may sacrifice for that good our time and our blood, but all this work and all this sacrifice appear to me to remain useless if we neglect and despise the sexual life, the eternally self-renewing elementary school of true altruism."

From the vital phase in which, marked by the visible manifestations of puberty and by the first appearance of menstruation, ovulation is assumed to begin, the sexual life of woman continues to the period of life in which, marked by the climacteric cessation of menstruation, ovulation also ceases. The total duration of this sexual period in woman's life is usually about thirty years; but it is subject to great variations, from six to forty-six years, according to the available statistics, these variations depending upon climate, race, constitution, and the sexual activity of the person under consideration.

The duration and the intensity of the sexual life of woman depends upon a series of external conditions affecting the individual, but especially upon the inherited predispositions, upon the constitutional condi-

tions, upon the varying vital power of the individual. My own observations have led me to formulate, as a general law, that the earlier a woman (climatic and social conditions being similar in the cases under comparison) arrives at puberty, the earlier, that is to say, that menstruation first makes its appearance, the greater will be the intensity and the longer the duration of sexual activity, the more will the woman in question be predisposed to bear many children, the more powerfully will the sexual impulse manifest itself in her, and the later will the menopause appear. It seems that in such women a more intense vitality animates the reproductive system, bringing about an earlier ripening of ova, a more favorable predisposition on the part of these ova to fertilization by the spermatozoa, a livelier manifestation of sexual sensibility, and a longer duration of ovarian functional activity.

My general views on this subject are embodied in the following propositions:

1. The duration of sexual activity is less in the woman belonging to the countries of southern Europe than in those belonging to the countries of northern Europe. It would appear that in those climates in which ovulation begins sooner and menstruation first appears at an earlier age, the menopause also appears earlier; but that, on the contrary, in those climates in which puberty is late in its appearance, the decline of sexual activity is similarly postponed.

2. Women in our mid-European climates, in whom puberty appears at an early age, the first menstruation occurring between the ages of thirteen and sixteen, exhibit a more prolonged duration of the sexual life, of menstrual functional activity, than women in whom menstruation begins late, between the ages of seventeen and twenty. Extremely early appearance of

the first menstruation—so early as to be altogether abnormal—has, however, the same significance as abnormally late onset of menstruation; both indicate that the sexual life will be of short duration.

3. Women whose reproductive organs have been the seat of a sufficient amount of functional activity, who have had frequent sexual intercourse, have given birth to several children, and have themselves suckled their children, have a sexual life of longer duration, as manifested by the continuance of menstruation, than women whose circumstances have been just the opposite of these, unmarried women, for instance, women early widowed, and barren women. Sexual intercourse at a very early age, however, accelerates the onset of the climacteric period and the termination of the sexual life. The same result follows severe or too frequent confinements.

4. The sexual life has a shorter duration in the women of the laboring classes and belonging to the lower strata of social life, as compared with upper class and well-to-do women. Bodily hardships, grief, and anxiety also hasten the onset of sexual death.

5. Women who are weakly and always ailing have a shorter sexual life than women who are powerfully built and always in good health. When irregularities and disorders have appeared in the various sexual phases, the decline of sexual activity occurs earlier than in women whose functions have in this respect been normal. Certain constitutional conditions, such as extreme obesity, certain acute diseases, such as typhoid fever, malaria, and cholera, and certain diseases of the uterus and its annexa, chronic inflammatory conditions for instance, bring about a notable shortening of the duration of the sexual life.

In addition to climate, nationality, and the age at

which menstruation begins, the sexual activity of women also exercises an influence on the duration of their sexual life, and of especial importance in this connection are the number of children born, and exercise or neglect of the function of lactation. From my own observations on this matter it appears, that in women who are healthy and of powerful constitution, whose reproductive organs have been sufficiently exercised, who have given birth to several children and have suckled these children themselves, the duration of menstrual activity is in general notably longer than in women whose circumstances have been just the opposite in these respects. Among the women in my own series of cases in whom menstrual activity lasted longest, of the 177 women in whom menstruation ceased between the forty-fifth and the fiftieth year of life, 1 only was unmarried, 2 were married but childless, 32 married with 1 or 2 children only, and 142 married and with more than 2 children; of the 89 women in whom menstruation ceased between the fiftieth and the fifty-fifth year of life, none were either unmarried or childless, 19 were married with 1 or 2 children, 17 married and with more than 2 children; of the 17 women in whom menstruation ceased later than the fifty-fifth year of life, there were 2 only with less than 2 children, but 10 who had each given birth to from 6 to 8 children. A similar influence is exercised by the function of lactation. Among 40 women who had not suckled their children, the average duration of menstrual activity was four years less than the general mean.

As regards the conditions of life, L. Mayer affirms that the duration of sexual activity among well-to-do women is on the average a year and a half longer than among women of the working classes.

Metschnikoff has drawn attention to the remarkable disharmony in the development of three of the phases of the sexual life of woman, inasmuch as the sexual impulse, the union of the sexes, and the capacity for procreation, which, considering their nature and purpose, might have been expected to be attuned so as to act in harmony, exhibit as a matter of fact no such relation; the different factors of the sexual function develop independently and unharmoniously. In a child not yet fitted to fulfil the function of procreation, the sexual impulse will none the less make its appearance, and be liable to misuse. In the girl the pelvis does not attain that complete development which fits it for the process of parturition until toward the age of twenty, whilst puberty occurs at the age of sixteen. "A girl of ten is capable of aspiring to play the part of a woman, but not before the age of sixteen is she fitted to play that part, nor indeed fitted to become a mother before the age of twenty."

In general, we may say, regarding the women of our own part of the world, that in those who are healthy, who lead a regular life, are well fed, free from the pressure of anxieties, with their sexual functions sufficiently exercised, the duration of the sexual life is longer than in women whose circumstances are the reverse of those just enumerated. It is a sign of decadence when women of the well-to-do classes, leading a life of ease, manifest a diminished duration of the sexual life. The greatest physical power and the highest ethical development are associated with a lengthening of life in general, and associated also with a lengthening alike in the sexual life of woman and the sexual potency of man. A decline in morals and culture entails a diminution of sexual vital capacity, this being true alike of individuals, of families, and

of nations. Woman is venerated and valued the more, the longer the duration of her sexual life; a woman in whom the sexual life is short quickly loses value and significance, both in domestic and in social circles.

The social significance of the sexual life of woman is disproportionately greater and farther reaching than the sexuality of the male, as the former is concerned with the fundamental principles of human social life, influencing the constitution of the family, and controlling the good of the coming race. Sexual purity, which to the youth is a romantic dream, is to the maiden a vital condition of existence; adultery, in the husband a pardonable transgression, is in the wife an overwhelming sin committed against family life. To the freedom of the male in affairs of love is opposed the strict restraint of the female, based on monogamic marriage. The sexual needs and desires of the female are transformed in an ideal manner by means of the feeling of duty of the wife and mother; the violent pressure of the sexual impulse is restrained by the opposition of ethical forces. When this restraint fails, the running off the rails that ensues has a far profounder influence in the case of the female than of the male, an influence not limited to her own personality, but dragging down the whole family into the abyss of consequences, into the depths of moral and physical destruction.

Though in nature everywhere the same, the sexual life of woman exhibits in the various gradations of social life different outward manifestations, from the brutal sexual congress that does not greatly shun publicity, to the modern would-be philosophical free love. And throughout all variations the two darkest points remain, the illegitimate child and venereal infection, both of which entail upon the woman the most un-

speakable anxieties and the greatest possible misery, whilst the man, who is in either case to blame, passes comparatively unscathed.

The social sexual position of woman suffers most at the present day from the mature age at which under existing social conditions men are alone able to marry and from the ever-increasing number of cases of venereal infection. In both these directions social science and medical skill must work hand in hand for the amelioration of the sexual life of woman.

On the twentieth century falls the duty of furnishing a solution for these problems. Contesting voices are heard on all sides. Tolstoi's rigid demand for complete sexual abstinence, the exhortation of the professors of the German universities to their students in favor of moral purity, the associations for the official prevention of venereal diseases, the agitation among young men in favor of abstinence from sexual intercourse before marriage, finally, the clamorous voices of the supporters of women's rights—all these are influences within the sphere of sexual morality which must lead slowly but surely to extensive social changes in the sexual life of women.

The discussion of the sexual life of woman, which for many centuries was concealed by a thick veil from the eyes of the profane, or was viewed only through the frosted glass of poetical metaphor, has in recent times assumed a quite revolting character. Not only have the acquired liberties and the social aims of the present day a tendency to give women in general a freer and higher position, to emancipate them from the bonds in which owing to the conditions of family life they have so long been shackled, but some members of the women's rights party go even farther, and

demand for women greater freedom in the sphere of sexual activity.

With this end in view the sexual life of woman is used as the fulcrum of the lever, and is withdrawn from the twilight into the open light of day, or indeed too often into a dazzling and altogether false illumination. Women writers especially, who have hitherto been accustomed to delude themselves and the world with sensational representations of the feminine soul, of feminine modesty, and the fineness of feminine sensibility in matters sexual, now find their greatest joy in unveiling themselves and their sisters before the face of all the world, and in discussing in the plainest language the most intimate processes of the genital organs. In writings exhibiting but little good taste, though all the more temperament, they emphasize again and again one side only of the sexual life, to wit, the sexual impulse, the force of which is intentionally exaggerated to a high degree, so that it is described as a mighty current of passion, which may with great pains be held in check for a season, but must ultimately break loose, and with devastating rage must overwhelm everything which has hitherto been regarded as discipline and good morals. Young girls, even, step down into the arena to take part in the contest concerning the reform that is to take place in the relations between men and women.

From a mistaken standpoint other supporters of women's rights oppose the ideal method in sex-relations, life-long monogamy, and the ideal of sexual sensibility, motherhood, and they put forward quite new sexual pretensions on behalf of women, as belonging to them by natural right. Upon these pretensions it is the duty of physicians, who truly know and truly prize womanhood, to pass their judgment, and that

judgment, which will find ample justification in the ensuing descriptions of the individual phases of the sexual life of woman, is that the modern movement on behalf of the emancipation of women goes much too far. We do not, however, mean to imply that this movement is totally unjustified.

The growing girl must not, as has hitherto been the case, be kept in a state of ignorance (which is indeed in most cases apparent merely) regarding the sexual processes of her own body, she must no longer, when she asks to be informed concerning these matters, be put off with conventional lies and prevarication. But her enlightenment must not be effected in such a manner as to lead to excitement and excessive stimulation, to the awakening of slumbering feelings, and to the conversion of fantasy into a devouring flame. Sexual enlightenment must not be made an excuse for the unchaining of sensibility. When about to be married, a woman should certainly be instructed regarding her sexual duties and rights, and enter as one well informed into the act in which she is to play a leading part. But she ought not, with the excessive valuation of herself attained in recent times, to regard the man as her enemy, as one whom she is always justified in fighting and always ready to fight with the equal weapons of sexual transgression. It cannot be doubted that the ideal of "pure marriage" at an early age is one greatly to be prized as the foundation of a powerful future generation; but the real nature of the male must not be overlooked, nor must his sexual honor be put to too difficult a test. We regard as reasonable the modern demand of woman that in marriage her individuality should not be buried, and that space should be given for the development of her personality; but every sober-minded person will reject the "moral

demand" for "ideal passion" in accordance with "entire mutual freedom" in the sexual relation between man and wife, and will regard such free love as social insanity and as a barbaric retrogression toward the rude sexual habits of savage peoples. Further, in view of the continually increasing intensity of the struggle for existence and in view of the difficulties of the task of rearing children, we cannot fail to recognize that it is not right for women to be overburdened with the task of reproduction, and that she does not live simply and solely for the bearing of children—but those rush to the other extreme who undervalue motherhood and the duties of maternity, who speak scornfully of the woman who is "a mother, and a mother only," who despise women whom they regard merely as "means for the production of children," and who employ all possible methods to free women from the pressing claims of nature and of society.

In all social circumstances and in all times the great principle of sexual morality must dominate the sexual life of woman. As the ethical characteristics of the three great epochs in that sexual life we recognize the purity of the maiden, the faithfulness of the wife, and the love of the mother. But within the limits imposed by these demands it is still possible to satisfy the modern claim for a free development of the personality, and to accommodate the circumstances of the sexual life to the individual vital needs and vital claims of the present day.

I

THE SEXUAL EPOCH OF THE MENARCHE (PUBERTY)

The term *menarche* was introduced by me into medical literature to denote the period of life in which, as a sign of puberty, menstruation first makes its appearance.

The age at which this occurs is subject to variations depending upon race, occupation, hereditary tendencies, and climate; but in Germany and Austria the average age at puberty is 14 or 15, the extreme limit being 12 to 19.

Until about the age of 13, the physical differentiation of the sexes, except for the anatomical peculiarities of the genital organs, is in our climates a trifling one. But at puberty the important changes occur by which the sexes are so strikingly differentiated. Whereas in the growing boy all physical change takes the form of increasing strength and energy, in the development of the girl, we note the appearances of the rounded outlines so characteristic of womanhood. At the same time the voice alters, becoming less sharp, with a softer quality, and yet a fuller tone; and we may observe that young brunettes have commonly a contralto voice, young blondes, more often a soprano. The intellectual changes undergone by the girl at puberty are no less extensive and characteristic than the physical changes. In brief, the undifferentiated, neuter girl is transformed into a young woman, endowed with all the attributes, mental and bodily, characteristic of femininity.

As regards the age at which the menarche usually occurs, and the manner in which its occurrence is anticipated or retarded by the various influences already mentioned, the following propositions may be put forward, based on the available statistics and observations:

1. Climate is an important factor. In the torrid zone, menstruation appears at a very early age, on the average from 11 to 14; in the temperate zone, it appears later, on the average from the age of 13 to 16; in the frigid zone, later still, on the average from the age of 15 to 18. The mean temperature of the atmosphere appears to have a direct influence on the age at which menstruation begins, the hotter the climate, the earlier being the menarche. The height of the place of residence above the sea-level and its distance from the coast also have a certain influence.

2. Race and constitution have a distinct influence upon the age at which menstruation makes its appearance. In women of the Semitic races the menarche occurs earlier than in women of the Aryan race. The average age at which menstruation begins in Jewish girls, from 14 to 15; in Magyar girls from 15 to 16; in German girls from 16 to 16½; and in Slavonic girls from 16 to 17.

In general the menarche is earlier in girls of a sanguine, lively temperament and a powerful constitution than in girls of a phlegmatic temperament and a weakly constitution; further, other things being equal, menstruation appears earlier in brunettes, girls with black hair, thick skin, dark eyes, and a dark complexion, than it appears in blondes, girls with light hair, thin skin, blue eyes, and a fair complexion.

3. The age at which menstruation begins is also affected by the conditions of life and the social circumstances. In the higher circles of society, in the upper,

well-to-do classes, menstruation appears earlier than among women of the laboring classes, who are compelled to strive for their daily bread. Amongst upper-class girls the menarche occurs at the age of 14 in one-fourth of their number, whereas among lower-class girls barely one-sixth begin to menstruate at the age of 14.

In large towns, again, menstruation appears earlier than in small towns, whilst in the open country the menarche is still further delayed. In the women of Paris the average age at the menarche is 14 years and 6 months, in the women of smaller French towns it is 14 years and 9 months, in French countrywomen it is 14 years and 10 months.

How far the mode of nutrition is concerned in the production of these results is not yet determined.

4. The time of the menarche appears to be influenced by inheritance to this extent, that the daughters of women who began to menstruate early begin themselves to menstruate at an early age, whereas in other families we observe that both mothers and daughters began to menstruate late. But this relation is by no means a constant one.

Ploss has collected observations made in various countries and towns regarding the age at which menstruation begins, and the mean results of these observations are given below.

The average age at which menstruation began was:

In Swedish Lapland	18 years, 0 months.	0 days.
In Christiania	16 years, 9 months.	25 days.
In Copenhagen	16 years, 9 months.	12 days.
In Munich	16 years, 5 months.	12 days.
In Göttingen	16 years, 2 months.	2 days.
In Vienna	15 years, 8 months.	15 days.
In Berlin	15 years, 7 months.	6 days.
In Stockholm	15 years, 6 months.	22 days.
In Manchester	15 years, 6 months.	0 days.
In Warsaw	15 years, 1 month.	23 days.

In London, between and	15 years, 14 years,	1 month, 9 months,	4 days. 9 days.
In Paris, between..... and	15 years, 14 years,	7 months, 5 months,	18 days. 17 days.
In Madeira	14 years,	3 months,	0 days.
In Montpellier	14 years,	2 months,	0 days.
In Corfu	14 years,	0 months,	0 days.
In Marseilles	13 years,	11 months,	11 days.
In Calcutta	12 years,	6 months,	0 days.
In Egypt	10 years,	0 months,	0 days.

The collective results of the investigations of French authors regarding the average age at which menstruation first appears are given in the following table:

I. IN TEMPERATE CLIMATES:

<i>Observer.</i>	<i>Place.</i>	<i>No. of Cases.</i>	<i>Average Age.</i>
De Soye	Paris	1,000	15 years, 0 months.
Dubois	Paris	600	15 years, 3 months.
Raciborski	Paris	200	14 years, 5 months.
M. Despines	Paris	85	14 years, 11 months.
Arau	Paris	100	15 years, 4 months.
Courty	Montpellier	600	14 years, 3 months.
Puech	Nîmes	941	14 years, 2 months.
M. Despines	Toulon	43	14 years, 1 month.
M. Despines	Marseilles	25	14 years, 1 month.
Puech	Toulon	144	14 years, 1 month.
Grey	London	1,498	15 years, 6 months.
Lee & Murphy	London	1,719	15 years, 6 months.
Torisiano	Corfu	33	14 years, 6 months.
Lebrun	Warsaw	100	15 years, 1 month.

from these observations we obtain an average of 15 years.

II. IN COLD CLIMATES:

<i>Observer.</i>	<i>Place.</i>	<i>No. of Cases.</i>	<i>Average Age.</i>
Ravn	Copenhagen	3,840	16 years, 9 months.
Frugel	Christiania	157	16 years, 6 months.
Dubois	Russia	600	16 years, 8 months.
Faye	Norway	100	15 years, 6 months.
Lundborg	Esquimaux	16	15 years, 6 months.
Wistrand	Stockholm	100	15 years, 7 months.

from these observations we obtain an average of 16 years and 3 months.

III. IN HOT CLIMATES:

<i>Observer.</i>	<i>Place.</i>	<i>No. of Cases.</i>	<i>Average Age.</i>
Goodeye	Calcutta	239	12 years, 5 months.
Lith	Deccan	217	13 years, 5 months.
Roberton	Calcutta	540	12 years, 6 months.
Webb	Calcutta	39	12 years, 5 months.
Dubois	Asia	600	12 years, 11 months.

from these observations we obtain an average of 12 years and 7 months.

In 6,550 cases collected by Krieger menstruation first appeared:

<i>At the age of:</i>	<i>At the age of:</i>
9 years in 1 instance.	20 years in 281 instances.
10 years in 7 instances.	21 years in 111 instances.
11 years in 43 instances.	22 years in 55 instances.
12 years in 184 instances.	23 years in 15 instances.
13 years in 605 instances.	24 years in 15 instances.
14 years in 1193 instances.	25 years in 1 instance.
15 years in 1240 instances.	26 years in 4 instances.
16 years in 1026 instances.	27 years in 2 instances.
17 years in 758 instances.	28 years in 1 instance.
18 years in 582 instances.	29 years in 1 instance.
19 years in 425 instances.	

From these figures it appears that in the 6,550 cases under consideration, the age 15 was that at which the first appearance of menstruation was most frequently observed, namely in 1,240 instances, or 18.9 per cent. The age 14 comes next, with 1,193 instances, or 18.2 per cent. The case in this series in which menstruation appeared earliest, namely in the ninth year, was observed by Mayer, the girl being a blonde of average height, good family, and German descent; the case in which menstruation appeared latest, namely in the twenty-ninth year, was that of a woman living in Berlin, who was sickly and chlorotic up to the time of her marriage, and in whom menstruation did not appear until some years after that event.

As regards climatic influences, all the data at our disposal prove that the hotter the climate the earlier the menarche. According to Marc d'Espines the age at puberty varies in an almost geometrical ratio with the mean annual temperature.

The dependence of the menarche upon climatic influences is clearly shown by the statistical data collected from various regions of the world. We append the general compilation of Gebhard dealing with this question.

A. EUROPE

For Europe the data furnished by Ploss are grouped by Gebhard in the following manner.

i. *Northern Europe*

The average age at which menstruation first appears, according to the older statistics, is in Swedish Lapland 18, in Norway, 16.12. In Copenhagen it is 16.75, in St. Petersburg 14.5.

More recent statistics for Finland are furnished by Engström. Among 3,500 women of pure Finnish descent, he found that menstruation began:

At the age of:	At the age of:
8 years in 2 instances.	18 years in 195 instances.
9 years in 2 instances.	19 years in 91 instances.
10 years in 4 instances.	20 years in 31 instances.
11 years in 41 instances.	21 years in 8 instances.
12 years in 178 instances.	22 years in 10 instances.
13 years in 458 instances.	23 years in 2 instances.
14 years in 715 instances.	24 years in 1 instance.
15 years in 778 instances.	25 years in 0 instance.
16 years in 614 instances.	26 years in 1 instance.
17 years in 369 instances.	

Thus, in nearly half of all Finnish women, menstruation begins with the completion of the fourteenth

and fifteenth years. The statistics include women of all classes of society.

At the Pirogoff Congress Grusdeff furnished particulars of the first onset of menstruation in Russia among 10,000 women. Menstruation began:

At the age of:

At the age of:

9 years in	1 instance.	18 years in	910 instances.
10 years in	4 instances.	19 years in	498 instances.
11 years in	31 instances.	20 years in	183 instances.
12 years in	244 instances.	21 years in	65 instances.
13 years in	864 instances.	22 years in	19 instances.
14 years in	1641 instances.	23 years in	5 instances.
15 years in	1795 instances.	24 years in	3 instances.
16 years in	2012 instances.	32 years in	1 instance.
17 years in	1692 instances.		

In women of German race living in Russia puberty was earliest, occurring at the average age of 15.16 years; in Finnish women it was latest, occurring at the average age of 16.17 years.

2. Middle Europe

In Germany, according to the tables of Krieger and L. Mayer, who have recorded 11,500 cases in all, menstruation begins most commonly (in 18.931 per cent. of the cases at the age of 15; the next most frequent age is 14 (18.213 per cent. of the cases).

For Berlin, in a number of cases collected from the lower classes of society, we find the average age for the first appearance of menstruation to be 16.18 years.

Notwithstanding the more northerly situation of Berlin, the average age at puberty is somewhat less than in Munich, situated $4\frac{1}{2}$ degrees to the southward, for the reason that the retardation dependent upon altitude makes itself manifest in the latter town, which is situate about 500 metres (1,640 feet) higher above the sea-level. Whereas in Berlin 18 per cent. of all cases

begin to menstruate at the age of 14, and 19 per cent. at the age of 15, in Munich the two leading years are 15 with a percentage of 17½, and 16 with a percentage of 18¾.

In Great Britain, according to Krieger, the average age at which menstruation begins is 15 years, 1 month, and 5 days. For Manchester the age given is 15 years, 6 months, and 23 days. In France, according to the calculation of Brierre de Boismont, the most frequent age for the first onset of menstruation is 16. In Paris the average age is 14 years, 6 months, and 14 days. Bohemia, Upper and Lower Austria, and Moravia have an average age of 16 years and 2 to 3 months.

3. Southern Europe

In Southern Europe the influence of the higher mean temperature manifests itself. The average age at which Spanish girls begin to menstruate is 12. In Northern and Middle Italy the most frequent age is 14; in Southern Italy, 13. In Lyons the average age at which menstruation begins is 14 years, 5 months, and 29 days; in Marseilles and Toulon it is 13 years and 10 months. For Hungary, Doktor gives the statistics of 9,600 cases. In 22½ per cent. menstruation begin at the age of 15; in 20½ per cent. at the age of 16, and in 10 per cent. at the age of 17. The earliest age among these cases was 8 years; the latest, 33 years. (The latter must no doubt be regarded as pathological.)

B. ASIA

In Palestine puberty most commonly occurs at the age of 13; in Turkey even as early as 10. Rouvier calculated the average of 742 cases observed in Syria to be the age of 12. As regards Persian women, the

data vary between the age of 14 for the northern part of the country and the age of 9 or 10 for the southern. According to Joubert's data in 46.4 per cent. of the indigens of India, menstruation begins at the age of 12 or 13. Similar figures are given for Ceylon and for Siam. In Japan menstruation most frequently begins at the age of 14, sometimes as early as 13; mothers of 15 are by no means rarities in this country, but for menstruation to begin before the age of 12 is considered a very exceptional occurrence. According to a table dealing with 584 women of Tokio menstruation began:

At the age of:

11 years in	2 instances.
12 years in	2 instances.
13 years in	26 instances.
14 years in	78 instances.
15 years in	224 instances.

At the age of:

16 years in	228 instances.
17 years in	68 instances.
18 years in	44 instances.
19 years in	10 instances.
20 years in	2 instances.

The data available regarding China are so exceedingly variable that little importance can be attached to them.

C. AFRICA, OCEANIA, AND AMERICA

The average age at which menstruation begins in the negro women of Africa is from 10 to 13. In Algeria puberty occurs at 9 or 10 years. Among the Australian indigens, menstruation commonly begins as early as 8 years, and at the very latest at the age of 12 years. The data available concerning the indigens of the Oceanic Archipelago are extremely variable and inexact, but we cannot go far astray in stating the age of puberty among these to be from 10 to 13. In tropical South America girls begin to menstruate from the age of 9 to 14 years. The Indian women of North America begin to menstruate at the ages of 12, 13, 14,

or even as late as 18 or 20. In the Arctic zone of North America and in Greenland the onset of menstruation is delayed till 17 and even till 23 years.

As regards the position in life and the upbringing years it has been shown by numerous observers that among the well-to-do classes, whose mode of living is luxurious, and whose social circumstances allow free play to the imagination, menstruation begins at an earlier age than among the working classes, whose life is one of want and privation. According to the statistical data of Mayer regarding 6,000 women, menstruation began:

	<i>In women of the upper classes.</i>	<i>In women of the lower classes.</i>
At the age of 13 years.....	11.73 per cent.	7.06 per cent.
At the age of 14 years.....	23.90 per cent.	13.33 per cent.
At the age of 15 years.....	22.83 per cent.	14.56 per cent.
At the age of 16 years.....	14.10 per cent.	16.53 per cent.
At the age of 17 years.....	9.60 per cent.	13.33 per cent.

From this table we learn that in nearly one-fourth of the girls of the upper classes puberty occurs at the age of 14, whilst in girls of the lower classes barely one-sixth begin to menstruate at this age. The average age at the first menstruation in girls belonging to the upper classes is seen to be 14.69 years, but in girls belonging to the lower classes, 16.00 years. According to other observers the average age at the first menstruation is:

	<i>Briere de Boismont. (Paris.)</i>	<i>Tilt. (London.)</i>	<i>Krieger. (Berlin.)</i>	<i>Ravn. (Copen- hagen.)</i>
Amongst gentle folk and the rich	13 y. 8 m.	13 y. 5½ m.	14 y. 1 m.	14 y. 3 m.
Amongst the well-to-do middle classes	14 y. 5 m.	14 y. 3½ m.	15 y. 5 m.	15 y. 5½ m.
Amongst the lower classes	14 y. 10 m.		16 y. 8 m.	16 y. 5½ m.

Comparative observations on women living in towns and women living in the country show also that in

the former, menstruation begins on the average at an earlier age. According to Brierre de Boismont, the average age at the first menstruation is:

In Paris	14 years, 6 months.
In small towns	14 years, 9 months.
In country districts.....	14 years, 10 months.

Similarly it was found by Ravn that menstruation first occurred:

In Copenhagen at the average age of	15 years, 7 months.
In industrial towns	15 years, 4 months.
In country districts	16 years, 5 months.

Mayer states that the average age at which the first menstruation occurs is:

In townswomen	15.98 years.
In countrywomen	15.20 years.

In Italy, according to Calderini, in a thousand instances, menstruation begins at the age of 14 in 280, at the age of 15 in 219, at the age of 13 in 205, at the age of 12 in 116, at the age of 16 in 89, at the age of 17 in 55, at the age of 18 in 14, at the age of 11 in 7, at the age of 10 in 6, and at the age of 20 in 6 instances. In girls attending town schools, the first menstruation most commonly occurs in the months of June and August; but in girls attending country schools most commonly in the spring months.

A certain hereditary predisposition is so far determinant in the matter of the early or late onset of the first menstruation, that from a knowledge of the age at which menstruation began in the mother, we are able with great probability to predict the age at which it will begin in the daughter. Among fifty cases which I investigated with this point in view, I found forty-one in which the daughters of mothers who had begun to menstruate early began themselves to menstruate early, usually indeed in about the same year of life;

or conversely that when the mother had begun to menstruate late, late onset of menstruation was usually to be observed in the daughter also. Tilt relates a case in which a woman began to menstruate at the age of fourteen, and her daughter and granddaughter both began to menstruate at the same age. Courty observed a mother who began to menstruate at the age of eleven, and whose eight daughters all began to menstruate at the same age.

Gynecologists agree in stating that girls of sanguine temperament and powerful constitution begin to menstruate earlier than weakly and phlegmatic individuals. Tilt describes a peculiar ovarian temperament, in which menstruation begins early; such women have, as a rule, striking nervous sensibilities, with a dark complexion and glistening, longing eyes, always surrounded by dark rings.

The opinion is general that in girls with black hair, dark eyes, thick skin, and dark complexion, menstruation begins earlier than in blondes with blue eyes and delicate white skin. Brierre de Boismont states in this connection that not fair hair only, but also chestnut-tinted locks, indicate a late onset of menstruation. L. Mayer found that:

Of blondes. Of brunettes.

17.20 per cent.	18.84 per cent.	began to menstruate at the age of ..	14
16.89 per cent.	18.02 per cent.	began to menstruate at the age of ..	15
15.14 per cent.	16.59 per cent.	began to menstruate at the age of ..	16

According to the same author, the average age at which menstruation begins is:

In blondes	15.55 years.
In brunettes	15.26 years.

'As regards race, it is well known that in Jewesses menstruation begins at an early age. According to Joachim the age of puberty varies very greatly among

the different races inhabiting Hungary. The first menstruation appears:

In Slavonic girls between the ages of.....	16 and 17
In Magyar	15 and 16
In Jewish	14 and 15
In Styrian	13 and 14

FIRST APPEARANCE OF MENSTRUATION

The first appearance of menstruation is commonly preceded by various symptoms dependent on the increased flow of blood to the genital organs. Such symptoms are: Sacrache, dragging sensation in the loins; an indefinite feeling of pressure in the lower part of the belly, especially in the region of the uterus and the ovaries, which region is sometimes also tender on pressure; a slight feeling of weariness in the lower extremities; sudden flushings or pallors; alternating sensations of heat and chilliness, sometimes accompanied by actual though slight change of temperature. In many cases also there are disturbances in the intestinal evacuations and urinary secretion, in the process of cutaneous transpiration, and in the functional activity of the gastro-intestinal canal. A frequently observed symptom is an increased irritability of the entire nervous system, with an inclination to melancholy and indefinite amorous desires.

The nervous irritability manifests itself already before the appearance of the menstrual flow by headache and moodiness, weariness, nervous irritability, and low spirits; further, by slight changes in the facial aspect, dark rings round the eyes, spontaneous blushing, uneasy sensations, epigastric pain, loss of appetite, a sensation of pressure in the abdomen, palpitation, vertigo, dragging sensations passing from the loins to the thighs, feeling of weakness and numbness in the

lower extremities—symptoms which often endure for several months and in such cases tend to lower the resisting powers of the organism.

Courty enumerates as prodromal symptoms which are observed in the majority of girls before the first appearance of menstruation: swelling and tenderness of the breasts, sensation of fulness and weight in the hypogastric region, moderate intestinal meteorism, sacrache, aqueo-mucous vaginal discharge, finally, an itching sensation in the genital organs. These manifestations may also assume a morbid character, taking the form of violent abdominal and lumbosacral pain, general fatigue and weakness, dyspepsia and diarrhoea, cephalalgia, various kinds of neuralgia, some degree of moral aberration. After the first menstruation, two or three months may elapse before the girl menstruates again, but after the lapse of a year the flow usually recurs at quite regular periods. Sometimes the early periods are very violent and recur very frequently, every twenty days, for instance.

The greatest increase in size and weight occurs in the female sex at the time of the menarche. Amongst the poorer classes the greatest development in size and strength occurs between the ages of 13 and 15 years, whereas in the upper classes of society, those who ultimately attain the same weight exhibit their greatest growth at the ages of 12, 13, and 14 years. According to Pagliani the greatest growth in the female sex always precedes puberty, so that, for example, a girl who begins to menstruate at the age of 12 will grow most rapidly in the year preceding this, whereas a girl who begins to menstruate at a more advanced age will not undergo her most rapid phase of growth so early as the age of 11. According to the observations of Bowditch, A. Hey, Lombroso, Pagliani, and Ploss, up

to the age of 11 or 12 years the growth of girls exceeds that of boys, but whereas in girls growth ceases suddenly at the age of 14, in boys growth proceeds regularly up to the age of 16 years. At birth boys are on the average 1 cm. ($\frac{3}{5}$ "") longer than girls; but during puberty the female sex catches up to the male in height, or even surpasses it. According to Ploss, a girl of 16 or 17 years is as tall as a young man of 18 or 19 years.

The earlier development of the female as compared with the male at the time of puberty is a constant phenomenon, to be observed in all races, in every climate, and in all strata of society. According to the statistical data published by the authors just quoted, the age of greatest development in the respective sexes is:

	<i>In the female.</i>	<i>In the male.</i>
As regards weight at the age of	12 to 14 years.	14 to 17 years.
As regards height at the age of	12 to 13 years.	12 to 15 years.
As regards respiratory capacity at the age of	12 to 15 years.	15 to 17 years.
As regards muscular strength at the age of	12 to 14 years.	14 to 15 years.

Puberty occurs in the female on the average about two years earlier than in the male, and upon this difference the observed differences in growth also depend.

The menarche in the wider signification of the term includes the development which occurs at the time of puberty, and continues through a period of several months, and even years, before complete sexual maturity is attained; and includes also the time, which may be considerable, following the first appearance of the menses and before the regular rhythm of the menstrual function is established and the full development of the female genital organs is attained. This time, which forms a notable phase of the sexual life of wom-

an, is characterized by great changes in the genital organs and in the vital processes connected therewith, by a strong tendency to suffer from a series of very various pathological changes and disorders of function in the principal organs, and a lessened general resisting power to disease—a change which finds its most definite expression in the well-established fact that in this period of life the mortality among females is much greater than among males of corresponding age. According to the statistical data of Quetelet and Smits, from the age of 14 to the age of 18 (the period of the menarche) there are 128 deaths of females for every 100 deaths of males; and even in the four succeeding years, from the age of 18 to the age of 22, the unfavorable conditions peculiar to sex are witnessed by 105 deaths of females to every 100 deaths of males.

Many authors draw a distinction between the age of puberty, when the growth of the pubic hair occurs as an external sign of sexual development, and the age of nubility, when the individual becomes fitted for marriage. The distinction is a partial one only, inasmuch as capacity for copulation is attained already at puberty. The law, however, maintains such a distinction, the Austrian Penal Code, for example, regarding intercourse with a female less than fourteen years old as rape, and the German Code likewise punishing carnal knowledge of a girl under fourteen.

The signs of puberty in girls were noticed and explained in very early times. From the anthropological studies of Ploss and Bartels we take the following data regarding this matter. In the Bible we read (Ezekiel xvi. 7): "Thy breasts are fashioned and thine hair is grown, whereas thou wast naked and bare." The early Indian physician, Susruta, refers only to the regular recurrence of menstruation as a sign of puberty. That

a woman is menstruating may be known by the fact that her face is swollen and bright. In the Roman Empire Justinian ordained that all young women should be examined as to the growth or absence of the pubic hair in order to ascertain if they were ripe for marriage. The early Chinese physicians recorded that in every woman at the age of fourteen or fifteen years a monthly flow of blood from the genital organs began, the period of recurrence being thirty days. The physicians of the Talmud express themselves variously regarding puberty in women. In one place they advance as a sign of puberty the growth of the hair on the genital organs; in another they speak of the notable enlargement of the breasts, and mention as a sign of more complete sexual development that the nipples become elastic. Other Talmudists refer to the appearance of a dark brown coloration in the areola and to the enlargement of the mons Veneris as signs of puberty. Savage races regard the first appearance of the menstrual flow as the only sign of puberty, and among many such races this is the occasion of peculiar ceremonial rites. The attainment of puberty in savage tribes is often solemnized by the seclusion of the girls from the time of the first menstruation; they fast during the period of seclusion, which sometimes terminates in an elaborate ritual of purification.

For two reasons in particular, the period of the menarche is a time of storm and stress to women, first on account of the developmental processes in the genital organs, and secondly on account of the intellectual changes that occur at this period.

The local cause is to be found in the extensive transformation of the ovaries and the uterus, by means of which a peculiar and powerful stimulus, the menstrual stimulus, is elaborated, which has a reflex influence

upon heart and brain, vascular and nervous systems, and secretory and nutritive processes. Since we know that in every premenstrual period by the growth of the follicles hyperæmia is excited in the ovary, by means of which the liquor folliculi is increased in amount, we can well understand that at the time of the menarche the ripening of the graafian follicles is accompanied by a considerable degree of hyperæmia of the ovaries and of the whole of the genital organs, now undergoing their fullest development, and we can easily see how this hyperæmia may result in manifold reflex disturbances. But in addition to these reflex disturbances, we have once more to take into consideration the as yet imperfectly known chemical processes which are associated with the ripening and development of the graafian follicles, and an abnormal course of which may give rise to a disordered constitution of the blood, manifesting itself as chlorosis or in other ways. In connection with the growth and ripening of the ova, extensive and novel demands are made on the organism, and these may well endanger metabolic processes which are not established on a very secure foundation.

The other cause is to be found in the intellectual processes which occur at this time in the youthfully receptive, highly sensitive organ of mind, the brain. The girl growing into womanhood, who with astonishment and stress has witnessed the visible changes in her body, the outward signs of puberty, as they gradually make their appearance, receives powerful psychical stimulation which cannot fail to exercise an influence upon the entire nervous system and its complex interlacements, alike in the sensory and in the motor sphere.

The degree to which these influences radiating from the genital organs make themselves manifest is chiefly

dependent upon the resisting power of the nervous system as a whole, upon the temperament, the inherited constitution, and the mode of education of the young girl. In children belonging to families noted for sensibility and irritability, in dwellers in large cities who have attended high schools for girls and have at an early age lifted the veil that covers the sexual processes, the reflex disturbances of the menarche will be more manifold and will manifest themselves with greater intensity than in children brought up in country districts, whose sensibilities are chiefly physical and whose mind is less susceptible to the influence of external stimuli.

A further important consideration is the time at which the menarche occurs, and whether on the one hand it is at or near the average age, or whether on the other, as precocious menstruation, it is unusually early, anticipating the general bodily development, or again as retarded menstruation it is unduly delayed. In some cases of retarded menstruation, the external genital organs are thoroughly well developed, and it is menstruation only that remains in abeyance; but in other cases the external genitals are also backward in development, the pubes and mons Veneris being but sparsely supplied with hair, and the breasts remaining very small.

In addition to these abnormal temporal relations of the menarche, certain other irregularities at the commencement of menstruation are worthy of note. Thus, the first menstruation may be normal, but thereafter amenorrhœa may persist for several months, or if the flow occurs it may be exceedingly scanty, or very pale in color; on the other hand, menstruation may be very profuse, lasting many days.

The environment in which the young girl is placed

during the period of her sexual development has a great influence on the processes of the sexual life and on the pathological disturbances that affect these processes.

In working-class families the immoderate physical strain often thrown upon girls, in many cases continuous movements of the upper extremities whilst the lower extremities and the pelvis are absolutely quiescent, or conversely, an excessive employment of the muscles of the lower extremities—these circumstances in conjunction with insufficient nutriment, night-work, association when at work with persons of the opposite sex, and the frequent premature sexual stimulation, will combine to have a most deleterious effect.

Amongst country-folk, indeed, the girl has the enjoyment of fresh air, and as a rule nutritive food; moreover, there are not so many occasions of nervous stimulation; puberty therefore arrives more slowly and gives rise to less disturbance; but the ignorance of the girls very frequently leads to an early experience of coition, the natural and unnatural consequences of which have then to be taken into account.

Amongst the better classes of townspeople such hygienic regulations and educational measures are in common employment that young girls during the years of development usually receive reasonable care and attention—but very frequently, intercourse with older girls, association with young men, visits to theatres, evening-parties, and balls, and the perusal of stimulating literature, form unfavorable features of urban life which exercise their inevitable effects in the sexual sphere. In some cases, fortunately sufficiently rare, the stimulation of the sexual impulse and the longing for its satisfaction are so intense, that a kind of *demi-vierge* is brought into being, a young woman who is concerned

only to preserve the physical token of virginity, but whose thoughts and fancies are anything but maidenly. It is to be feared that in consequence of the excessive freedom in education and the emancipated independence of feminine youth, these "half-virgins" are increasing both in number and in intensity, a fact which cannot fail to increase also the number of sexual maladies and perversions.

It becomes comprehensible that even in healthy girls, the first appearance of the catamenia and likewise the expectation of the flow induce a certain modification and alteration in the whole nature and disposition. Girls often lose their previous cheerful and lively character, becoming quiet, self-absorbed, sometimes even melancholy; they are disinclined for study, have a repugnance to all sustained physical or mental activity, become annoyed and snappish on slight occasion, are restless at night, consider themselves to be ailing, and so on. During the first menstruation girls commonly appear pale and anxious, they have blue lines beneath the eyes, the face has a tired aspect, the movements lack energy, and a general want of tone combined with an abnormal irritability may be noticed. Some days before the first menstruation, the vulva, the labia majora and minora, and the vaginal mucous membrane, are swollen, the clitoris becomes conspicuous in consequence of erectile processes, a slight secretion appears in the genital passage, and the breasts become sensitive and slightly turgid. The urine deposits a thick sediment, and occasionally severe strangury is observed. In many cases, also, digestive disturbances occur, loss of appetite, constipation, or a tendency to diarrhœa.

The first menstruation usually lasts four or five days. On the first day the discharge is blood-stained mucus, thereafter becoming sanguineous. In some cases, the

bleeding at the first menstruation is profuse and of long duration.

It is not always after the first menstruation that the subsequent discharges follow at the regular intervals of four weeks. In delicate, anaemic girls the second menstruation may not occur till several months have elapsed after the first; less often the second menstruation ensues a fortnight after the first, or even earlier.

At the time of the menarche the sexual impulse, which has hitherto been dormant, becomes strongly developed. It is evoked at this time of life by the anatomo-physiological changes undergone by the reproductive glands; the stimulus aroused by these processes in the ovary, being conducted to the brain, awakens passion. At the same time the observation of the growth of the hairy covering on the genital organs, the development of the breasts, and the appearance of menstruation, tend to arouse erotic presentiments. The reading of romances, conversations with female friends, and observation of the conduct of full-grown persons, convert these presentiments into clear ideas, and excite the impulse to the production of passionate sexual sensations, the sexual impulse. How far these stimuli arising from the reproductive apparatus are encouraged and accentuated, on the one hand, or repressed and diminished, on the other, depends on external impressions of various kinds. The environment is the determinant for the further transformation of the as yet undifferentiated sexual impulse into the fully-developed copulative and reproductive impulses.

In his work on the *Physiology of Love*, Mantegazza describes the yearning and stress of the awakening sexual life, arising out of the presentiments, hazy sensations, and impulses, which are felt in the very earliest period of the developmental phase known as puberty.

In general, in a young girl during the menarche, the sexual impulse manifests itself rather in the form of semi-conscious reverie, of platonic love. The adolescent girl exercises her imagination with the circumstances of her chaste love, her mind turns to this subject when in solitude, her mood is apt to become melancholy, and it is the perusal of equivocal novels, or the educational assistance of sexually experienced female friends, that transforms the sexual impulse to a vivid flame.

Some authors believe that a sign of the awakening of the sexual impulse when directed toward some particular man is a change of color on the part of the girl when she sees this individual or hears him spoken of. Palpitation of the heart comes on, the pulse is increased in frequency, the respiration also, and the voice fails. In this manner, it is asserted, Galen discovered the love of a Roman lady, Justa, for the dancer, Pylades.

The psychological reaction of the sexual impulse at the time of puberty manifests itself, as von Krafft-Ebing points out, in manifold ways, common to all of which, however, is the emotional state of the mind, and the need that the strange and new feelings now experienced should find some objective centre of interest. Such objective and emotional interests lie ready to hand in religion and poetry, both of which, after the period of sexual development is at an end, and the originally incomprehensible desires and impulses have received an explanation, continue to have intimate relations with the world of sexual experience. Any one who doubts this must be reminded of the frequency with which religious fanaticism makes its appearance at the time of puberty. No less influential is the sexual factor in the awakening of æsthetic feelings. This world of the ideal opens itself at the time when the development

of the sexual processes begins. * * * The love of early youth, continues von Krafft-Ebing, has a romantic, idealizing tendency. In its first manifestations it is platonic, and willingly exercises itself in poetry and history. But as the sensibility awakens, the danger arises that this passion, with its idealizing power, will be transferred to persons of the opposite sex who in intellectual, physical, and social relations are by no means all that could be wished. Hence proceed misalliances, elopements, and seductions, with the entire tragedy of impassioned love, which conflicts with the dictates of morality and convention, and sometimes finds its bitter end in suicide or a double self-destruction. Love in which the senses play too prominent a part can never be a true and lasting love. For this reason, first love is as a rule very transitory, since it is in most cases no more than the first flare of passion. * * * Platonic love is a thing without existence, a self-deception, a false description of sexual sensations.

Bebel remarks that the number of suicides among women of the ages of sixteen to twenty-one years is an exceptionally large one, and he refers this chiefly to unsatisfied sexual impulse, unfortunate love, secret pregnancy, and to betrayal by men.

MENARCHE PRÆCOX ET TARDIVA

(*Precocious and Retarded Menstrual Activity*)

By the term *precocious menarche* we understand the pathological state in which a typical, four-weekly, sanguineous discharge from the female genital organs sets in at an abnormally early age, and is to be regarded as a symptom of a premature sexual development. Very commonly such children with precocious menstruation

and premature sexual development, exhibit a comparatively high body-weight, great development of fat, early dentition; they look older than their years; and they have genital organs that also develop very early, with hair on the pubes and in the axillæ; the labia majora and the breasts resemble those of full-grown women, and the pelvis also has the adult form. Commonly also the sexual impulse develops early, whilst, in other respects, the intellectual development lags behind the physical. It is most probably a primary hyperplasia of the ovaries that gives rise to precocious menstruation, the ovarian follicles ripening earlier than usual. Frequently other pathological processes are associated with this early sexual development, such as general lipomatosis, rachitis, and new growths of the ovaries. In several cases of this nature, early conception has also been observed. According to oriental tradition, Khadijah was married at the age of five years to the prophet Mohammed, who cohabited with her three years later.

Even if we except those cases in which in earliest infancy there is a sanguineous discharge from the vagina which remains, however, an isolated occurrence, or if repeated is repeated a few times only and at quite unequal intervals (cases in which the bleeding cannot be regarded as menstrual—such, for instance as were reported by Eröss of six new-born female infants in whom a sanguineous discharge from the vagina appeared three or four days after birth and lasted two to five days, the infants not remaining subsequently under observation),—numerous well-authenticated cases yet remain in which menstrual hæmorrhage was observed before the end of the first year of life. One case, even, is recorded by Bernard in which from the time of birth to the twelfth year menstruation with mo-

limina occurred every month, lasting two days; from the twelfth to the fourteenth year menstruation ceased, recurring subsequently at irregular intervals.

In the recorded cases of such precocious menstruation the menstruation recurred as a rule at regular intervals of four weeks; only in quite exceptional cases were the intervals three to five months.

In several of these cases of premature puberty, sexual intercourse and even parturition occurred at a very early age. A girl in whom menstruation began at the age of one year, gave birth to a child when she was ten years old (Montgomery). A girl who began to menstruate at the age of nine years, became pregnant very shortly afterward (d'Outreport). The well-known case recorded by Haller, in which at birth the pubic hair was already grown, and in which menstruation began at the age of two years, was also one of very early pregnancy, the girl giving birth to a child when nine years old. Another girl in whom at birth the pubes were already covered with hair began to menstruate when four years old, copulated regularly from the age of eight, and at nine years became pregnant, and was delivered of a vesicular mole with an embryo (Molitor). A girl began to menstruate at the age of two, had a growth of hair on the pubes and developed mammae at the age of three, and became pregnant at the age of eight (Carus). With these cases must be classed that observed by Martin in America of a woman who was a grandmother at the age of twenty-six. Lantier, in his *Travels in Greece*, speaks of a mother of twenty-five with a daughter of thirteen.

Observations made by Kussmaul and by Hofmeier prove that in many cases changes in the ovaries form the probable cause of precocious menstruation and the other phenomena of premature puberty. In one case

of Hofmeier's, for instance, of a girl of five with precocious menstruation, the removal of a rapidly growing ovarian tumor was followed by the cessation of menstruation, and the pubic hair, which had been shaved off, did not grow again.

The opposite state to menarche *præcox* is that in which the first appearance of menstruation is unduly delayed; it may be even till after the age of twenty. Such a postponement of the menarche sometimes occurs in girls who exhibit at this period of life an extraordinarily great general fatty development of the body, or a notably severe chlorotic state of the blood, or in whom during the years of development some sudden and extensive change in the mode of life has occurred, as for instance when the girl's place of residence has been removed from the country to the town, or when she has had to undertake some completely new kind of physical or mental work. Raciborski attributes the late appearance of menstruation, at the ages of 20, 22, 24, or 26, in otherwise healthy girls, to an "apathy of the sexual sense," a phrase which does not convey much meaning.

In some cases, notwithstanding the delay in the appearance of the menarche, the genital apparatus is developed to a degree quite in correspondence with the age, but some pathological condition is present, for instance, the mucous membrane secretes excessively, exhibits a catarrhal tendency, there are erosions at the os uteri, etc.

Menstruation, after its first appearance in normal fashion, may be suppressed in young girls in consequence of mental impressions, such as sudden fright; such cases are observed after an escape from a fire, or after a railway accident. Mental stimuli of less intensity but longer duration have a similar effect; some-

times these take the form of auto-suggestion. A well-known instance of the latter phenomenon is furnished by the case of a girl who, in consequence either of actual intercourse or it may be merely of too intimate an embrace with a man, fears she has become pregnant, and actually suffers from amenorrhœa though pregnancy does not really exist. I saw a case in which amenorrhœa was thus produced in a girl seventeen years of age, whose ideas on the process of sexual intercourse were still far from clear. She had permitted a young man to kiss her repeatedly and fervently, and to clasp her in a close embrace. She was then afraid that she had become pregnant; the catamenial flow, which had been regular since she was fifteen years old, ceased to appear; and it was not until at length I was consulted, was able to assure myself that the girl was essentially virgin, and was, therefore, in a position to reassure her as to her own condition, that menstruation again became regular.

Functional amenorrhœa may also occur in young girls in consequence of a sudden change in the conditions of life, a removal from town to country, for instance, or the reverse, travel in regions where the climatic conditions differ widely from those hitherto experienced, or a change from an active to a sedentary kind of occupation. Of this nature is the following case observed by Winter: Miss Q., aged 20; menstruation began at the age of 13 and was regular thereafter; on three successive occasions amenorrhœa occurred during a visit to Berlin, in one case lasting 3 months, another 2 months, and a third 6 weeks, whereas when at home menstruation was regular though somewhat scanty. There were no molimina. Examination showed the wall of the uterus to be thin, length of this organ 7 centimetres ($2\frac{3}{4}$ "), both ovaries distinctly palpable.

Such a form of amenorrhœa as this commonly disappears when the girl removes from the conditions unfavorable to the fulfilment of her sexual functions to the conditions favorable to that function.

Not infrequently a chill is in young girls the cause of suppression of the menstrual flow that has hitherto been quite regular, especially effective in this respect being, standing in cold water, getting the feet wet, the influence of rain and wind at the menstrual period on the insufficiently clothed lower extremities, and vaginal injections with water at too low a temperature. Such cases are common among the working classes, especially in washerwomen; but they are also observed among the well-to-do. An example is given by Winter: Miss H., aged 19; menstruation began at the age of 13, regular, at intervals of 4 weeks, the flow lasting 2 to 3 days, and being normal in amount. Several years ago the patient caught a severe cold through paddling in cold water during the period. Suppression of the menses resulted, amenorrhœa being complete for a year and a half. Then menstruation recommenced, but was irregular, sometimes anticipating, sometimes postponing the proper period, the interval being occasionally as long as four months; when it occurred, the flow was represented by a drop or two of blood only, and dysmenorrhœa was severe. At each proper period, if the flow failed to appear, severe molimina occurred in the form of abdominal cramps and headache. Examination showed the uterus to be normal in shape, $4\frac{1}{2}$ centimetres ($1\frac{3}{4}$ ") in length, with a very thin wall; both ovaries were palpable, but smaller than normal.

The commonest form of amenorrhœa at this period of life is, however, the constitutional amenorrhœa associated with chlorosis. In chlorotic subjects we have to do, not with a symptomatic absence of the menstrual

discharge, but with a failure of the ovarian function, the graafian follicles failing to ripen. We generally find, according to Gebhard, that chlorotic girls begin to menstruate at the usual age, or even earlier. Menstruation recurs once or twice at irregular intervals, and then gives place to complete amenorrhœa, it may be suddenly, it may be gradually, the flow on each occasion being scantier than before. In chlorotic patients, the menstrual discharge, when present, is very thin and watery, and often contains a large admixture of mucus derived from the cervical canal and the cavity of the uterus. The amenorrhœa may be of short duration; or it may last for a long time; so that it is not until after the lapse of months or years, and as a rule in consequence of suitable treatment, that menstruation recurs, being henceforward either normal in frequency and strength, or on the other hand permanently scanty and of the postponing type. The associated disorders from which the patients suffer take the form of headache, dizziness, syncope, feelings of oppression, disinclination for mental and physical exertion, and so on. Since in such cases the ripening of the ovarian follicles also fails to occur, when the amenorrhœa is complete the menstrual molimina are generally wanting (Gebhard).

Stephenson also states that in girls who have been chlorotic for a longer or a shorter time, menstruation frequently begins very early, in any case earlier than in healthy girls.

Usually in these cases various other disorders are associated with the amenorrhœa, such as colicky pains in the abdomen, sensitiveness of the abdominal wall to contact or pressure, headaches, attacks of hemicrania, general mental depression, and hysterical manifestations.

In chlorotic girls, at the times when menstruation is due, a watery discharge often occurs, sometimes slightly tinged with blood. Dysmenorrhœa may also occur at such times.

Attacks of menorrhagia in young girls are usually dependent on disturbances of the nervous system. Sometimes such an attack occurs at the very first menstrual period. Occasionally also menorrhagia may occur in association with chlorosis, to be distinguished according to Virchow from a rare condition named by him "menorrhagic chlorosis," characterized by excessive menstruation of an anticipating type. The bleeding is in such cases seldom very profuse, however, but the periods are very long, and the intervals exceedingly short. Castan regards such profuse menorrhagia and metrorrhagia occurring in young chlorotic girls, especially at the commencement of puberty, as of an endoinfective nature dependent upon auto-intoxication. The toxins lead to inflammatory and degenerative changes in the muscular substance of the uterus. According to Fraenkel in these cases the ovaries are usually enlarged, seldom smaller than normal.

Inflammatory Processes.

Chronic metro-endometritis, both corporal and cervical, occurs occasionally in young girls during the years of development. It is especially common in chlorotic subjects; and next to these in girls who are careless about the observance of hygienic precautionary measures during the menstruation. Thus it may result from physical exertion among the working classes; and from dancing, skating, riding, or mountaineering, among girls belonging to the well-to-do classes, during menstruation. Again, we meet with it in girls who work very hard at the sewing-machine; and, finally,

in those who have long practised masturbation. Through uncleanliness at the time of menstruation, the blood with which chemise and drawers are stained and the pubic hair soiled, undergoes decomposition, and this may lead to catarrhal inflammation of the vulva and vagina and of the endometrium. The most striking symptom in persons thus affected is the discharge of mucus, which in cervical metro-endometritis leads to a very moist condition of the external genitals, and leaves greenish-yellow spots on the under-linen; in corporal metro-endometritis the discharge is of a thinner consistence, milky in appearance, and not very abundant. As a result of the endometritis, the patient suffers from various pains in the body, a feeling of fulness, sacrache, general sense of fatigue, and divers nervous manifestations; sometimes also from dysmenorrhœa, strangury, or obstinate constipation. In consequence of the great thickening of the mucous membrane that often occurs, menstruation becomes very profuse and long-continued, lasting from one to two weeks.

In consequence of long-continued masturbation, other pathological changes may take place in the female genital organs, such as hypertrophy of the nymphæ, proliferation or glandular hypertrophy of the uterine mucous membrane, ovarian irritation, pains in the ovarian region which, in severe attacks, may radiate to the thighs. These pains become more severe at the menstrual period, especially at the beginning of that period; and are sometimes also especially troublesome in the middle of the intermenstrual interval, in this case usually as a result of great bodily exertion.

These morbid processes in the genital organs of young girls have long attracted the attention of physicians, and it is more than sixty years since Bennet

described the "virginal metritis" observed by him in twenty-three virgins. Bonton published in 1887 a monograph on this condition. Gallard assigns masturbation as its principal cause.

Retroflexion of the uterus is also sometimes observed in virgins, induced by the bad habits which are so common in young girls of retaining the urine for excessively long periods and of neglecting constipation. The prolonged distention of the bladder leads to a daily, long-continued stretching of the ligamentous apparatus of the uterus; the full bladder presses the uterus backward, and after the viscus has been emptied, the flaccid ligaments are no longer able to restore the uterus to its normal position of anteflexion. The organ is left with its fundus directed backward, and the intra-abdominal pressure keeps it permanently in this position; at the same time, an accumulation of fæces in the rectum, by pressing the cervix forward, favors this displacement of the uterus. Moreover, when the uterine tissues are flaccid through malnutrition in chlorotic or anæmic subjects, the organ yields more readily to mechanical influences than it would if its muscular tone was healthy.

Disorders of Hæmatopoiesis

According to Virchow, two distinct forms of chlorosis are to be recognized, one form in which no great abnormalities of the reproductive apparatus exist, and another form in which imperfections in the development of the central portion of the vascular system are associated with similar imperfections in the reproductive apparatus. In many cases of chlorosis, he found the ovaries small and imperfectly developed, in an infantile condition; in other cases, however, they were three times the normal size; the development of the

uterus in such cases usually corresponds with that of the reproductive glands. With regard to the etiological connection between chlorosis and developmental disturbances, Virchow inclines to the view, that in chlorosis a predisposition, either congenital or else acquired in early youth, must be assumed to exist, but that this does not manifest itself by the production of actual disorder until the arrival of puberty; and he considers it likely that primary deficiencies of the blood and the vascular apparatus hinder the development of the reproductive apparatus.

Stieda found that in chlorotics displacements of the uterus were common, with abnormal narrowness of the vagina, absence of the pubic hair, imperfect development of the pelvis, and the growth of the breasts interfered with to this extent, that the nipples and areolæ were abnormally small. He classifies these manifestations as disturbances of development in the sense that they are among the so-called stigmata of degeneration. If in chlorotics the breasts in certain cases have a normally full and rounded appearance, this appearance is sometimes deceptive, the fulness being due, not to a proper growth of the parenchymatous mammary tissue, but to an excessive deposit of fat. Genuine chlorosis, therefore, not referable to some other primary disorder, is a developmental disorder, in the sense in which various other stigmata of degeneration met with in the human body are developmental disorders, and is indeed frequently associated with other stigmata of degeneration, or with malformations due to arrest of development, as for instance, an infantile type of pelvis or of genital organs, abnormalities of the cranial bones, vaulted palate, the root of the nose broad and depressed, extreme prognathism.

Hegar also maintains the view that chlorosis is in

most cases a developmental disturbance, the origin of which is not limited to the so-called years of puberty; it often arises from noxious influences which are either strictly inherited or began to operate when the infant was still in her mother's womb. Fraenkel is inclined to regard a primary development disorder of the genital organs as the cause of many cases of chlorosis.

The intimate relationship believed to exist between chlorosis and the sexual life of woman finds expression in the opinion, which dates back to the days of antiquity, and has been widely held even by physicians, that the disease is due to sexual abstinence in individuals with powerful sexual impulse, and that for this reason chlorosis is often cured by marriage. This result of marriage, which, though apparently merely, may indeed often be witnessed, is explained by Kahane on the ground, that in very many cases, the symptoms of chlorosis become less severe after the first five years have elapsed since the commencement of puberty, the improvement occurring quite independently of the marriage or continued celibacy of the sufferer. The influence of marriage in curing chlorosis is thus apparent merely to this extent, that a very common age for marriage in women is precisely in the twentieth, twenty-first, or twenty-second year, when five years have passed since menstruation began. By this time the organism will to a large extent have become accommodated to the demands made upon it by the processes of puberty. Experience also shows that chlorotic girls sometimes continue to suffer from the various symptoms of chlorosis even after they have become wives, and that chlorosis is not infrequently rendered more severe by the puerperium—but in a wife it is no longer customary to describe such symptoms by the name of chlorosis, they are called anaemia, hysteria, nervousness, etc. Further,

in order to give the doctrine of *morbus virgineus* its death-stroke, Kahane directs attention to the fact that numerous cases of chlorosis are met with in young girls who are far from practicing sexual abstinence, especially, for instance, amongst the lower classes, in whom it is hardly customary to wait for marriage before beginning sexual intercourse. The connection between masturbation and chlorosis, which has also been widely alleged from the etiological standpoint, is moreover one that cannot be admitted. On the other hand it is easy to understand that the erotic reveries which are so often seen in chlorotic girls are very likely to induce the habit of masturbation.

In young girls at the time of the menarche, especially in those who suffer from amenorrhœa or from irregular menstruation, the anæmic form of obesity not infrequently develops. Such patients at the time of puberty exhibit signs of marked anæmia in association with a notable increase in fat. The skin in such cases is always strikingly pale and of a whitish-yellow color; in bodies which are in other respects beautiful the bust may have the appearance of a marble statue. Such girls are strikingly stout, but the fatty tissue is flaccid, soft, and spongy, and dependent parts readily become œdematosus; the muscular system is generally feeble.

What especially characterizes this anæmic form of lipomatosis in young girls is, that, even in mild forms of the affection, cardiac symptoms are apt to become prominent. Frequent and violent palpitation will occur even in the absence of any severe exertion or especial excitement, often also we see shortness of breath, precordial pain, anxiety, respiratory distress, and sensations of chilliness and fatigue.

The principal cause of the obesity in these cases is to be found in the anæmia, inasmuch as the diminution in

the number of the erythrocytes is a diminution in the number of the oxygen-carriers, and this entails defective and insufficient oxidation. The deficiency in the albuminous constituents of the body also gives rise to a rapid and extensive deposit of fat, the power for the combustion of the fats absorbed from the food being insufficient. An auxiliary factor in producing obesity in such anæmic girls is their disinclination to physical exercise, dependent on the speedy onset of sensations of fatigue. The long-continued repose of the muscles, and the remaining almost continuously in close rooms insufficiently supplied with oxygen, also result in the withdrawal from the blood of the circulating fat and its deposit as adipose tissue.

'Albuminuria at the time of the menarche is a disease of development which is not infrequently met with in chlorotic girls, as in adolescent boys. On examination of the urine in such young girls we detect the presence of a variable quantity of albumin, which is present especially after severe physical exertion, mental application, or emotional excitement, whilst the urine secreted at night is usually free from albumin. The skin is pale, the accessible mucous surfaces are comparatively colorless, the face is puffy, the eyelids are œdematosus; the patients suffer from various nervous troubles, especially headache and dizziness, and they are also liable to dyspeptic disorders.

When the period of the menarche is safely passed, when the menses recur with regularity, and the chlorotic manifestations disappear, when the process of hæmatopoiesis has improved in quality, and the growth of the body is completed—when, in short, the functional equilibrium of all the vital processes becomes re-established, the albuminuria of puberty ceases. It seems, however, that those who have suffered in this way are

predisposed to a return of the albuminuria at the climacteric period, when the metabolic balance is once more disturbed.

Cardiac Disorders

The commonest cardiac disorder at this period of life is nervous palpitation, occurring in young girls who are in other respects in good health, being free from anaemia and from any discoverable disease of the heart or vessels. That this disorder is dependent on the sexual processes is indicated by the fact that it first manifests itself in a stormy manner some time, weeks it may be or months, before the first appearance of menstruation; recurring at irregular intervals, the attacks continue till after the first menstruation, and cease soon after the regular return of the period. Objectively, the palpitation of the heart manifests itself by an increase in the frequency and strength of the cardiac impulse, and increased frequency and tension of the pulse; in a few cases, however, it is perceived subjectively only by the patient, as a distressing sensation of excessively frequent and powerful cardiac action. In the former group of cases, the enhanced activity of the heart is perceptible, not only by auscultation, by which we usually find the heart-sounds quite pure, but also by inspection, which shows us the violent agitation of the thoracic wall and increased pulsation of the carotids. On percussion, no change is found in the area of cardiac dulness. The frequency of the pulse is increased, usually reaching 120 to 140 beats per minute; it is full, and may be intermittent or irregular. In those cases in which the palpitation of the heart is a purely subjective sensation, we find no increase either in the frequency or in the strength of the pulse, which may indeed be less frequent than normal. With the palpitation is asso-

ciated a sensation of strong pulsation in the great vessels of the neck, and often there is pain on the left side of the lower part of the chest, with a sensation of shortness of breath, respiratory distress, precordial pain, and a feeling of pressure upon the chest. Respiration is shallow, and abnormally frequent. The attacks of palpitation recur daily in some patients, in others at intervals of several days; they may occur entirely without exciting cause, or with a cause so trifling that it would not in a normal subject have produced any nervous excitement; the duration of the attacks varies from a few minutes to several hours, and they may occur either by day or by night; in the intervals between the attacks the functions of the heart and the arteries are conducted in a normal manner. The pulse-curves I have obtained during the attacks of palpitation, in those cases in which the manifestations were objective as well as subjective, exhibit a high pulse-wave, the upstroke being rapid and steep, the downstroke also sudden and steep, the predicrotic elevation but little marked, the dicrotic elevation often very distinct.

Less frequent than such attacks of palpitation recurring at irregular intervals are paroxysmal attacks of tachycardia, in which the frequency of the heart and pulse is increased to an enormous extent. This disorder manifests itself a little time before the first appearance of menstruation, thenceforward recurring regularly every three or four weeks, accompanying menstruation, or occurring at the proper menstrual period if menstruation is in abeyance; the attack lasts several days. This trouble also disappears a few months after the establishment of menstruation.

Associated with these cardiac troubles are, not constantly indeed, but in the majority of cases, disturbances of the digestive organs.

From the heart-troubles already described, another group of cases must be distinguished, which are also observed at the time of the menarche. They occur in girls in whom the first appearance of menstruation is strikingly delayed, not having yet begun at the ages of 18, 19, or 20 years, or in whom considerable irregularities have occurred in connection with the commencement of menstruation. In such girls, in whom menstruation has appeared late and been irregular, or who are perhaps entirely amenorrhœic, cardiac troubles may be so pronounced that the physician may be led to suspect the presence of organic disease of the heart. The most prominent symptom is frequent and violent palpitation, with strong pulsation in the carotids, respiratory distress, and feeling of anxiety, on continued exertion or even on very slight occasion. On percussion, the heart is not found to be enlarged; on auscultation, the heart-sounds are found to be very loud, often with a systolic murmur in the mitral region, whilst over the lower end of the internal jugular vein, the humming-top murmur is audible. The pulse is increased in frequency, at times arhythmic, and easily compressible. The sphygmographic tracing usually shows a subdicrotic or dicrotic character. The upstroke is not high; the downstroke descends low, almost to the lowest level of the curve, before the enlarged dicrotic elevation begins. The skin is always strikingly pale; pale also are the visible mucous surfaces, the hæmoglobin-richness and the corpuscular richness of the blood are considerably diminished, a feeling of fatigue and various other nervous manifestations are constantly present—in short, in all cases we have to do with the well-known chlorotic disposition, sometimes in association with the manifestations of the anæmic form of lipomatosis universalis. In several such cases, skin affections

were also present. Some suffered from acne vulgaris of the face with the usual comedones; others perspired profusely from the palms of the hands and the soles of the feet; others exhibited a bluish coloration of the nose and the ears.

There is yet a third form of heart trouble, much rarer indeed than the forms already described, from which young girls sometimes suffer at the time of the menarche. It occurs in girls who just before the first appearance of menstruation have grown very rapidly, "shooting up to a great height." They are not anæmic, nor do they appear "nervous;" but they are extremely thin, and they have grown enormously in height during the previous year. These individuals also, who in the previous course of their life have been free from heart trouble, now complain of cardiac distress. As in the cases previously described, they complain of severe palpitation, a feeling of fulness in the chest, shortness of breath on exertion, etc.; but the results of the objective examination are very different. The cardiac dulness is increased in area, especially in vertical extent, the apex-beat may be normal in position or displaced outward, the impulse is always heaving, abnormally powerful and resistant, the heart-sounds, especially those of the left ventricle, are louder than usual, the aortic second sound accentuated, sometimes ringing, the carotids pulsate visibly. The radial pulse, the tension of which is abnormally high, can be compressed by the finger only with difficulty; sometimes it is jerky in character. The sphygmographic tracing shows a rapid and steep upstroke; in the downstroke, the predicrotic elevation is much larger than normal and also nearer the summit of the curve. Thus we see that all the signs of cardiac hypertrophy are present, hypertrophy, that is to say, of the left ventricle.

The cases of this nature that have come under my observation have not been in girls of the working classes, but among the well-to-do. We cannot therefore regard them as due to overstrain of the heart in consequence of excessive bodily exertions, comparable to the cases met with in young recruits after long marches and violent exercise. We must rather assume that the development of the female genital organs has evoked a storm in the cardio-vascular system, more especially that in some way an increased resistance has been offered to the work of the heart, and that thus the hypertrophy has been brought about; though we may suppose that other unfavorable influences have also been in operation. Such an influence, in these cases, is the rapid growth of the body, which makes enhanced demands on the work of the heart; another is furnished by the almost universally worn unhygienic article of clothing, the cuirass-like corset, which offers a rigid hindrance to the rapid growth of the female body, to the development of the breasts, the thorax, and the upper abdominal organs, and which fails to accommodate itself to the changing conditions of growth, so that much extra work is thrown upon the heart. In such young girls we have very frequently found tight stays, which were worn unchanged without regard to the growth of the body in length, and which, by pressure on the epigastric region, elevation of the diaphragm, and limitation of the respiratory movements of the thorax, actually offered such considerable resistances to the driving power of the heart, as ultimately to lead to hypertrophy of the cardiac muscle.

Summing up our observations, we find that at the time of the menarche cardiac disorders occur in young girls which may be arranged in three groups of cases:

1. Nervous palpitation and paroxysmal tachycardia

in persons in other respects in good health, the affection appearing shortly before the commencement of menstruation, and disappearing soon after the flow is regularly established.

2. Cardiac disorders occurring in young girls suffering from chlorosis, which itself results from the processes of the menarche.

3. Cardiac hypertrophy developing at the time of the menarche, and dependent on the circulatory disturbances associated with that process, its appearance being favored also by rapid growth of the girl and by unsuitable clothing (tight lacing).

With respect to the activity of the heart and the circulation of the blood at the time of the menarche, the little-known observations made by Beneke, on the growth of the heart and arteries in the various stages of development, deserve especial attention. According to this writer, the growth of the heart is slow until the age of fifteen years is attained, but becomes accelerated at the commencement of puberty. During this time of puberty, the blood-pressure attains its highest level, being comparatively low in childhood and later in life. The development at puberty of the female heart is less extensive than that of the male heart, and for this reason throughout adult life the capacity of a woman's heart is on the average 25 to 30 cubic centimetres (1.5 to 1.8 cubic inches) less than that of a man. In women, also, the great arteries are on the average somewhat smaller than in men. The various arteries do not develop with equal rapidity throughout the period of growth; after puberty the common carotid grows very much more slowly than the common iliac artery, the former vessel being the only large trunk which has already nearly reached its maximum size at puberty.

The comparatively great development which the heart undergoes at the time of puberty is a phenomenon so important alike in its physiological and its pathological relations that it deserves the special designation of the *puberal development of the heart*; the commencement and the completion of puberty appear beyond question to be to a large extent dependent upon this development of the heart and upon the simultaneous rise in the blood-pressure of the systemic circulation due to the comparative diminution in the calibre of the arteries.

In the literature of this subject of cardiac disorders during the menarche, we find only short annotations on palpitation of the heart in young adolescent girls, and on cardiac manifestations in chlorotic subjects. Further, the statistical fact that valvular lesions of the heart are commoner in women than in men is by many authors explained on the ground that the disturbances of the time of puberty, which certainly occur more frequently and are more severe in the female sex than in the male, play an important part in their causation. Changes also in the vessel, such as cirsoid aneurysm, are supposed to be connected with the sexual processes of this period of life. C. Heine maintains that in consequence of puberty and of the sexual functions that become established at this period, a teleangiectasis will not infrequently undergo transformation into a cirsoid aneurysm; especially in cases in which menstruation is scanty and irregular, angiectatic tumors may exhibit a vicarious periodic increase.

Krieger describes nervous palpitation and also "cramps of the heart" as occurring in girls who have not yet begun to menstruate, in the form of prodromal manifestations; similar attacks may occur also at every menstrual period in girls in whom menstruation is fully

established. In most of these cases the pulse is increased and the patients complain of a sensation of anxiety, and speak of feeling the heart roll, tremble, or flutter, to which is sometimes superadded a sensation of sudden cessation in its activity. Not infrequently there is a blowing, adventitious sound, masking or accompanying the heart-sounds; there are also venous murmurs, especially when the heart-trouble is associated with anaemia or chlorosis. Of the cases of pseudo-angina pectoris observed by Krieger, the attacks occurred as prodromal manifestations before the first appearance of menstruation in 22 per cent. of the cases, after menstruation was fully established in 78 per cent. of the cases; as regards the relation of the attacks, in cases of the latter group, to the menstrual period, they occurred before the flow in 33 per cent., during the flow in 67 per cent.; menstruation was irregular in 10 per cent. of the cases under observation, in most of the other cases menstruation had been irregular, but was now regular.

Diseases of the Nervous System

The extensive transformatory processes occurring in the genital organs of young girls at the time of the menarche, and the powerful impression which the new thoughts, hopes, and fears excited at this period of life cannot fail to exercise on the nervous and emotional life, will enable us to understand how it is that the appearance of the first menstruation may give rise, especially in neurasthenic or psychopathic subjects, to manifold nervous disturbances and also to disorders of the mind.

On the other hand, the first appearance of menstruation has sometimes a favorable influence in girls suffering from nervous or mental disorder. This is seen, for

example, in cases of chorea in fully developed, rapidly growing girls who have not yet begun to menstruate; in such subjects the chorea sometimes disappears as soon as menstruation is regularly established.

Quite frequently, the first appearance of hemicrania in young girls coincides with the menarche. According to Warner, hemicrania made its first appearance:

In 1 girl of 3 to 4 years.	In 4 girls of 10 to 11 years.
In 2 girls of 5 to 6 years.	In 2 girls of 11 to 12 years.
In 1 girl of 6 to 7 years.	In 4 girls of 12 to 13 years.
In 5 girls of 8 to 9 years.	In 15 girls of 13 to 15 years.
In 5 girls of 9 to 10 years.	

Toothache, according to Holländer, in the early days of puberty sometimes exhibits the twenty-eight-day type of menstruation. The same periodicity has been recorded in cases of vicarious bleeding from the gums in girls suffering from disturbance of the menstrual function.

In the period of the menarche and before this period, chorea minor occurs, as a functional disturbance of the motor region of the nervous system, and especially in girls is it associated with the processes of the period of physical development. The statistical data supplied by a number of authors, Hughes, Pye-Smith, Russ, Sée, and Steiner, show that the proportion of boys to girls affected with chorea minor is 1 to 2.8, and that of all ages 49 per cent. of the cases occurred at the ages of 6 to 11 years, 29.8 per cent. at the ages of 11 to 13 years. In several cases, in quite young girls suffering from chorea, pathological changes were found in the genital organs. Ovarian tenderness was manifested on palpation, and always on that side on which the chorea had first manifested itself. Leonard found in a girl aged eleven suffering from chorea, adhesion of the præpu-

tium clitoridis; after the separation of the prepuce, the chorea disappeared.

As in respect of various nervous affections, so also in respect of various mental abnormalities, we witness at the time of the menarche numerous manifestations confirming the statement that, "no spinal reflex has such widely-opened and easily accessible paths of conduction toward the organ of mind, as the sexual reflex." "The menstrual process," continues Friedmann, "is the only bodily process in relation to which the organ of mind somewhat readily loses the remarkable stability of its equilibrium."

In the experience of all alienists, it is, speaking generally, the inherited psychopathic tendency that especially manifests itself at the time of puberty; and it appears that this predisposition, the manifestations of which the resisting powers of childhood have hitherto been competent to suppress, undergoes a sudden and stormy development in consequence of the action of the menstrual stimulus, leading to the unexpected appearance of mental disorders. The commonest of these are mania and melancholia of the ordinary type, the prognosis in first attacks being favorable; next in frequency to these are the psychoses characterized by fixed ideas, which usually terminate favorably after a short time; finally, we meet with the moral psychoses of puberty, and the form of melancholia distinguished by Kahlbaum as *Hebephrenie*,¹ the prognosis of which is very unfavorable, for it speedily terminates in dementia, similarly to the dementia of puberty described by Svetlin, dependent upon or associated with premature synostosis of the cranial bones. Very often we witness at

¹ *Hebephrenie*.—There is no current English equivalent of this word, used by Kahlbaum to denote a form of melancholia occurring at puberty, and terminating in dementia.—Tr.

puberty the beginning of the periodic varieties of mental disorder, which develop into periodic menstrual psychoses, manifesting themselves regularly at the recurrence of every menstrual period.

The fact that hysteria often first manifests itself at the time of the first appearance of menstruation was noticed already by Hippocrates, who indeed believed that the association was sufficiently explained by the well-known manifold relations between this nervous disease and disturbances in the female genital organs. The first hysterical attack often coincides with the first menstruation; or the first menstruation may lead to the recrudescence of hysteria which had manifested itself previously, but had passed into abeyance. We have to deal chiefly with the minor forms, such as uncontrollable and unconditioned attacks of laughing and crying, *globus hystericus*, *clavus hystericus*, etc.; hysteria major, on the other hand, is very seldom observed at the time of the menarche. As regards the frequency of hysteria at the time of puberty, we append certain statistical data.

Landouzy found:

4 cases of hysteria occurring at the ages of.....	1 to 10 years.
45 cases of hysteria occurring at the ages of.....	10 to 15 years.
105 cases of hysteria occurring at the ages of.....	15 to 20 years.
80 cases of hysteria occurring at the ages of.....	20 to 25 years.

After the age of twenty-five is attained, the frequency of hysteria declines very rapidly.

According to Bernutz, all the statistical data prove that hysteria in more than half the cases first manifests itself either just before or simultaneously with the commencement of menstruation. It seems also that at the time of puberty amenorrhœic and dysmenorrhœic manifestations may give rise to the development of hysteria. In girls at this time of life, hysteria seldom

takes the form of the great hystero-epileptic crisis, manifesting itself rather as nervous and moody states of mind, moral changes, weakness of will, in association with various forms of anæsthesia, spasm, and paralysis.

On the threshold of puberty the girl with a hereditarily neuropathic disposition may exhibit a tendency to epilepsy. In such cases, as Kowalewski writes, the patient has sudden attacks of loss of consciousness, commonly ushered in by a wild scream; during the attacks, tonic and clonic muscular spasms occur, the patient is completely insensible, the pupils are dilated and do not react to light, the pulse-frequency is increased—in short, the typical phenomena of an epileptic fit are exhibited. The loss of consciousness lasts from two to three minutes; and when the girl recovers, she remembers nothing of what has occurred during the fit. Though consciousness has returned, the mind is still at first somewhat disordered; but this disorder soon passes off, the girl becomes calm, and forgets what has happened. The physician is summoned, but in ninety-nine cases out of a hundred he assures the relatives that "the attack is nothing of any consequence—a simple fainting-fit, the result of menstruation—a transient trouble merely." A second "fainting-fit" disturbs the calm of the parents, but the reiterated authoritative assurance of the physician that "the trouble will soon pass away" restores their confidence; and they gradually become accustomed to the "fainting-fits" from which their daughter suffers at each successive menstrual period. The daughter marries, and gives birth to neuropathic and psychopathic children, and every one wonders what can be the cause of this misfortune. Hence it is necessary to pay careful attention to these "fainting-fits during menstruation." In the great majority of cases they are in fact epileptic seizures, and as such

they must be treated. Binswanger points out that in such cases, in which epilepsy first appears at the commencement of menstruation, the attacks may continue to accompany menstruation for several years thenceforward. Already established epilepsy is said by some authors, Lawson Tait, Tissot, and Marotte, for instance, to undergo at puberty in young girls an increase both in the severity and in the frequency of the attack; Esquirol, on the contrary, attributes to puberty a favorable influence on the course of epilepsy, a view held already by Hippocrates.

Not infrequently, attacks of precordial pain associated with tachycardia occur during the first menstruation. These attacks are usually of short duration.

Acromegaly, a disease regarded as a trophoneurosis, also requires mention here, this disturbance of growth being considered by several authors, and especially by W. Freund, to be in some way connected with the development of puberty; the tendency to acromegaly, it is suggested, is produced by the remarkable transmigration that occurs at puberty of the energy of growth from its accustomed paths into new channels. The relations which Neusser has shown to exist between the ovaries on the one hand and the vegetative nervous system and the process of haemato poiesis on the other, give a certain amount of support to this hypothesis, even though we have no intimate knowledge of disturbances occurring in the reproductive system during the period of development, which might have an influence in the causation of acromegaly.

Of old and of recent observations on the psychoses connected with the menarche, there is no lack. From the time of Hippocrates down to the present day, the authorities have continued to report cases in which the commencement of menstruation proved the exciting

cause of the appearance of psychoses. Rousseau writes of a girl at the time of the menarche, who before the first appearance of menstruation suffered from attacks of melancholia and a tendency to pyromania, and under the influence of the latter tendency she twice committed acts of incendiaryism.

According to Kirn, the psychoses that manifest themselves in the first period of the commencement of menstruation, sometimes melancholia, sometimes amentia in the form of slight and transitory maniacal derangement, more rarely a katatonic¹ condition, may precede the menarche, or may accompany or follow it.

A special form of psychosis is associated with the menarche (von Krafft-Ebing, Griesinger, Friedmann, Schönthal). The influence exercised by puberty in this direction manifests itself in various ways, and is the more powerful for the reason that several factors are in operation, each of which exercises an individual influence upon the type of the psychical affection; these factors are, childhood, the development of puberty, and the periodicity of the disturbance exercised by the menstrual reflex. The last named of these influences is the most potent. It manifests itself in the following manner: Certain psychoses which develop before the commencement of menstruation or during the suppression of the flow, undergo modification when menstruation appears; further, in the typical menstrual psychoses of psychopathically predisposed girls, the attacks recur either at the beginning of each period, or, when the flow is in abeyance, at the dates when it should appear—the menstrual stimulus thus being the exciting cause of the successive attacks in an organ of mind whose resisting powers are deficient; and, finally a disturb-

¹ Katatonia (*Katatonie*) is a term used in Germany to denote insanity associated with muscular rigidity.—Tr.

ance in the development of menstruation may be not merely the exciting cause, but the efficient cause of the psychosis.

In cases of the last kind, which have been observed by Schönthal and also by Friedmann, who has described them very fully under the name of primordial menstrual psychosis, we have to do with young girls in whom the appearance of menstruation is retarded, or in whom the flow has been suppressed very soon after its commencement. The girls were, as a rule, hereditarily well endowed, and the psychosis thus appeared without warning, like a storm from a clear sky. Exactly periodical in form and character, the period of recurrence being three or four weeks, this psychosis clearly showed its dependence upon menstruation; the individual attacks usually lasted a few days only, and were characterized by distinct mental disorder, in the form either of maniacal restlessness, or of dominant depression; vasomotor disturbances were very prominent, with disordered pulse, as, for instance, a rapid rise in the pulse-wave just before the onset of the attack, succeeded during the attack by a correspondingly rapid decline.

Friedmann enumerates a number of the peculiarities that characterize these attacks. The general course of the malady is an exceptionally stormy one. The ultimate cure may coincide with the definite regularization of menstruation; or, in cases in which menstruation is restored but remains inadequate, the course of the disorder may become a gentle undulatory one, the violent stimulus of total suppression being replaced by a more moderate stimulus—here also, however, a cure ultimately follows when menstruation at length becomes free as well as regular. But during the height of the malady a proper development of menstruation is al-

ways wanting. The total duration of the malady may vary from as little as two to as long as nine months, or even longer. The cure is, however, ultimately a complete one. The combination of a disturbed and delayed development of menstruation with a stormy periodic cycle of attacks of mental disorder, and the ultimately favorable termination, constitute, according to Friedmann, the peculiar characteristics of this form of puberal psychosis.

Masturbation

Masturbation is sometimes practised in very early childhood, being then commonly due to local irritation of some kind, as, for instance, when threadworms find their way into the vagina. Itching results, leading the child to rub the genital organs. This rubbing produces a pleasurable sensation, and gives rise to repeated masturbation. But in adolescent girls at the time of the menarche, a vague impulse arises to handle the genital organs, depending upon cerebral processes which are themselves the result of sexual sentiments, of reading, or of conversations with sexually instructed female friends. This vague impulse may lead to masturbation, and will do so earlier and more surely if the girl is a neuropsychopath by inheritance. The local influence of menstrual congestion, however, also plays a part in provoking the impulse toward masturbation, since at every period a hyperæsthetic state recurs in the genital organs.

Girls thus addicted have sometimes a very striking general appearance. They are pale, with a weary expression of countenance, their eyes are dull-looking and darkly ringed, their movements are sluggish, they like to spend a long time in bed—signs, however, which

I by no means wish to adduce as characteristic of onanists.

Temperament and mode of life are decisive in determining the greater or less frequency of the habit of masturbation in young girls. Girls of a passionate temperament, those also who from early childhood have been accustomed to mix much with young persons of the opposite sex, and those, finally, in whom from conversation on the subject with female friends or from the perusal of erotic literature, sexual enlightenment has occurred at an early age, experience the awakening of the sexual impulse earlier and with greater force, than phlegmatic girls, than those who have grown up apart from boys, and than those who have been strictly and carefully brought up. Masturbation may arise either instinctively or from instruction.

In young girls masturbation is usually effected by friction of the clitoris; less often by intra-vaginal manipulation, since this is liable to lead to injury to the hymen. For the former purpose the finger may be used; or some other article, such as a knot tied in the nightgown, or a rounded projection on some article of furniture; in one case the friction was effected by the naked heel.

An experienced physician, Gutzeit, is of opinion that in young girls of 10 to 16 years of age masturbation is on the whole less common than in boys of the same age, but that on the other hand from the ages of 18, 19, and 20 onward, "sexual self-gratification is almost universally practised by women, even if it be not always practised to excess," an opinion which cannot, however, be regarded as conclusive.

L. Löwenfeld remarks that the manifestations of the sexual impulse are not normally present in the days of childhood. In consequence of pathological conditions,

especially of such as affect the genital organs, in consequence of chance impressions, or in consequence of a bad example, sexual passion may indeed be awakened in children in its fullest intensity. Normally, however, the distinct manifestation of the sexual impulse is associated with a certain degree of development, of ripeness, of the reproductive organs. Physiologically, sexual passion is entirely wanting in young girls before the age of puberty.

As regards the act of sexual self-gratification, this author distinguishes two forms of masturbation: (a) Peripheral-mechanical; (b) mental (psychical onanism). In the former class of cases, the sexual orgasm is produced solely or chiefly by mechanical stimulation of the skin or mucous membrane of the genital organs. In the female sex, in addition to manual stimulation, an extraordinary variety of hard and soft articles are introduced into the vagina for this purpose. Many females effect sexual self-gratification by rubbing and pressing movements of the thighs one against the other, in which the clitoris is implicated. In psychical onanism, on the contrary, as Löwenfeld points out, the orgasm is produced solely by central stimulatory representations, without the assistance of any manipulation of the genital organs. The ideas that have this effect are for the most part lascivious trains of thought or the recollection of previous sexual experiences, on which the attention is concentrated. If we wish to estimate the harmfulness of the different forms of masturbation as regards the mind and the nervous system, psychical onanism must incontestably be regarded as the most deleterious.

In the female sex onanism is, in Löwenfeld's opinion, less widely practised than in the male; none the less, it is in the former sex far commoner than is generally

believed, a fact on which Eulenburg likewise insists. Frequently, also, in females, a congenital neuropathic tendency plays a part in the causation of masturbation, in so far as this tendency takes the form of premature sexual excitement or of excessive intensity of the sexual impulse. In the absence of this tendency, masturbation rarely leads to the production of well-marked nervous disturbances, and does so only when practised to very great excess. Beard reports that in the powerful and full-blooded working-class girls of the Irish race, masturbation, even when practised for many years, did not result in any notable disorder to health.

Disorders of Digestion

Disorders of the digestive apparatus are quite common in girls during the period of puberty, and usually take the form of nervous dyspepsia. Disturbances of sensibility predominate, with a sensation of pressure after meals, sometimes increasing to nausea, retching, and vomiting, as manifestations of general hyperesthesia of the gastric mucous membrane, loss of appetite, a disagreeable, pasty or acid taste, sometimes bulimia, perverse sensations of taste, and pyrosis. Especially in chlorotic girls, periodic attacks of pain occur, localized in the epigastrium and its neighborhood, and exhibiting no relation to the ingestion of food. The free hydrochloric acid varies in amount, being now normal, now diminished, sometimes also increased. In chlorotic cases, the symptoms of round ulcer of the stomach are sometimes observed. Intestinal activity is usually depressed, peristalsis is diminished, so that more or less obstinate constipation is one of the most frequent symptoms.

Hypertrophy of the tonsils at the time of puberty is in some way related to the menstrual processes,

whether by the intermediation of the nervous system or by that of the blood. Eisenhart quotes observations made by Chassaignac, of girls eighteen or nineteen years of age with hypertrophy of the tonsils, associated with retarded puberty, menstruation having begun late and being scanty, and the breasts being underdeveloped; in one young girl with tonsillar hypertrophy, one of the breasts had failed to develop properly, but after the removal of the tonsils it speedily grew to the normal size.

Diseases of the Respiratory Organs

Not uncommonly at this period of life the growth of a goitre is observed. The influence of puberty on the growth of the thyroid body has indeed been asserted by several authors; and Neudörfer maintains that precisely during the period of puberty to this body must be assigned an important regulatory trophic significance for the nourishment and growth of the reproductive organs. Steinberger and Sloan record the observation of cases occurring in young girls in whom, menstruation having first been regular, but having been suddenly suppressed in consequence of external noxious influences, a rapidly growing goitre suddenly appeared.

P. Müller states that in many regions, as for instance in Canton Berne, in Switzerland, where the school children exhibit with extraordinary frequency a hereditary tendency to the formation of goitre, during the years of childhood these growths are much less frequent in girls than in boys. At the time of puberty, however, this relation is entirely changed. Whereas in boys from time onward no further growth of the thyroid body is observed, in girls at puberty the hypertrophy greatly increases, so that very large goitres are formed. The same author recurs to the earlier ob-

servations of Heidenreich and Schönlein, as well as to those of Friedreich, by which this influence of puberty is strikingly manifested, and he believes it to be established by experience that sexual excitement can produce a transient swelling of the thyroid body. He alludes also to the remarkable fact that a swelling of the thyroid body, to which a number of animals show a tendency, occurs chiefly at the time of heat or rut; this is especially well known to occur in the case of stags. Similarly, during menstruation, a transient swelling of the thyroid body can sometimes be detected; the swelling is greater if the menstrual discharge fails to occur.

Diseases of the Organs of the Senses

At the time of the menarche in cases in which there is retardation or some other disturbance in the regular appearance of menstruation, affections of the eye are observed, which are in part functional, dependent on reflex influences proceeding directly from the genital organs without organic changes, and in part are due to circulatory disturbances. Mooren, S. Cohn, and Power have discussed the relations between the uterus and the eyes in general, and also in this especial connection. Of ocular troubles during the menarche, iridochoroiditis, haemorrhages into the vitreous body, long-continued blindness, and pannous keratitis, are mentioned, which may either disappear with the re-establishment of menstruation (spontaneous or artificially effected), or may exhibit in such circumstances a notable alleviation. Chronic inflammatory states of the conjunctiva, usually of an eczematous nature, which frequently occur at the time of puberty, often exhibit a relation to the menstrual process, a monthly exacerbation of the ocular trouble coinciding with disordered

menstruation, and cure taking place only when menstruation has become perfectly regular. Vicarious haemorrhages into the vitreous body also occur, associated with disturbances of menstruation, the relapses ceasing as soon as menstruation becomes regular; such a case was observed by Courserants in a girl of fourteen years.

Disturbances of hearing have been observed at the time of puberty in young girls addicted to masturbation; the patients complain of subjective noises, rising in intensity till actual hallucinations may be experienced. Lichtenberg reports the case of a strong girl eighteen years of age, in whom the congestion associated with puberty was followed by atrophy of the auditory nerve. The same author, also Ashwell, Law, Puech, Rossi, Stepanow, and Gilles de la Tourette, have published cases of vicarious menstrual haemorrhage from the external auditory meatus, occurring in girls of ages varying from 14 to 16, 17, 20, and 22 years. Amongst these cases, in some the auditory organ was in a healthy condition, but in others there was associated purulent discharge; the bleeding took place from the ears at the menstrual periods, the proper menstrual discharge being absent or scanty; after the ear trouble was cured, menstruation was normal. Of 200 cases of vicarious menstruation, there were, according to Puech, six in which the vicarious bleeding was from the ears.

Disturbances of the olfactory sense, taking the form, sometimes of diminished acuteness of this sense, sometimes of increased acuteness, and sometimes of perversion, also anomalies in the secretion of the nasal mucous membrane, either abnormal dryness, or greatly increased secretion of mucus, come under observation at this period of life, either as reflex manifestations

through the intermediation of vasomotor nerves at the time of the first appearance of menstruation, or in consequence of chronic nasal catarrh, which may be connected with masturbation. In cases in which the menarche is retarded, vicarious epistaxis may also occur, the bleeding sometimes being very profuse, in one case, indeed, reported by Fricke, in a girl seventeen years of age, having a fatal termination. According to Mackenzie, sexual excitement leads to swelling of the nasal mucous membrane, and habitual masturbation to chronic nasal catarrh; the same author asserts that during menstruation, swelling of the turbinate bodies may always be observed, and that in this lies the explanation of the fact that many women complain of a monthly cold in the head as an accompaniment of menstruation.

Diseases of the skin are not uncommon in young girls at the time of the menarche, and later, as an accompaniment of each successive menstruation. It is a well-known fact that at puberty girls sometimes lose a hitherto beautiful complexion, and suffer from various disfigurements of the skin of the face. These are produced especially by the profuse secretion of sweat, and by the excessive secretion of the subaceous glands, which so often results in acne, an inflammation of these glands. Ecchymoses also, effusions of blood into the skin, are observed, especially, as a form of vicarious menstruation, in cases in which menstruation is irregular. When actual bleeding occurs from the intact skin, the blood finds its way out through the sudoriferous ducts—haematidrosis occurs; in some cases, however, the haemorrhage takes place from areas of skin altered and injured by disease, from wounds or other injuries, from ulcers, or from excrescences. Haemorrhage into the skin occurs also in the so-called

stigmatization, in which condition also an etiological rôle has been assigned to menstruation.

In the skin, remark Spietschka and Grünfeld, a new life begins at the time of the development of puberty, and it is this which first gives to human beings the external characteristics of sexual maturity. In certain regions which have hitherto been covered only by fine downy hairs, thick, strong hairs develop, and at the same time the general growth of hair becomes more active. These regions are, the genital region, and the axillæ. This increased growth of hair is accompanied by a stronger secretion of the sebaceous glands, which very often is in excess of actual requirements, and may thus lead to cosmetic disturbances and to various diseases of the skin. Thus arise the various forms of seborrhœa. The commonest of these is the formation of comedones, which, at the time of puberty, may make their appearance especially on the nose, the forehead, and below the corners of the mouth, but also on other parts of the face or on the back and the breast; in those regions, that is to say, in which the sebaceous glands attain a considerable size. The retention of the sebum may give rise to inflammation, which the access of micro-organisms converts into suppuration. Thus arises acne vulgaris. In another form of seborrhœa, the secretion is more fluid in consistence, and collects on the surface of the skin, furnishing this with an oily covering. This most commonly occurs on the face; if the fatty layer is removed, the skin remains dry for a brief period only, and soon becomes greasy and shiny once more. Dust readily adheres to the greasy surface, and this gives the face a dirty appearance. Seborrhœa faciei is readily converted into eczema.

With the puberal development of the external genital

organs is associated an increase in the sebaceous secretion of these regions. On the clitoris and its prepuce, and on the folds and in the furrows of the vulva, in consequence of insufficient cleanliness, an accumulation of sebum and cast-off epidermic scales readily occurs; such an accumulation may become rancid, may irritate the skin, and may thus give rise to erosions and to purulent secretion.

In chlorotic girls at the time of puberty, on account of the anaemic condition of the blood, eczema is not uncommon, especially on the hands and the face. On the face, or on the forehead, red papules appear on circumscribed areas, and become vesicular; raw, weeping spots are thus formed, and have a very disfiguring appearance. Such eczema may occur also in connection with disturbances of menstruation, when the menses are scanty and pale, or when dysmenorrhœa is present.

At the time when menstruation ought to appear, but fails to do so, sometimes also, when menstruation is regular, with each successive period, an eruption of urticaria takes place; it usually disappears quickly, but in some cases is more persistent; owing to the intense itching it is always an extremely distressing complaint. Sometimes it takes the form of urticaria factitia, in which the skin reacts to every kind of mechanical stimulation, such as rubbing, scratching, or pressure, all of which alike lead to the formation of weals, which may be diffused all over the body. Less often in association with disturbances of menstruation, acute œdema or erythema are observed.

Finally, we must mention herpes progenitalis, a rather uncommon acute condition in which, with violent itching and burning sensation, intense redness and œdematosus swelling of the skin, vesicles form on the

præputium clitoridis, the nymphæ, and the inner surface of the labia majora.

Hygiene During the Menarche

It is the object of rational hygiene to increase the resisting power of the organism, which has been depressed by the processes of the menarche, in order that the increased demands made by the awakened sexual life may be adequately met.

The principal means for this purpose are, suitable diet, a suitable mode of life, and the employment of physical therapeutic measures, among which strengthening and hardening measures are to be preferred.

The diet should be at once as richly albuminous as possible and readily digestible, there should be several, four or five, meals every day; in chlorotic patients food should be taken at regular intervals of two to three hours. Meat should be a predominant article in the diet, but fresh vegetables should also be eaten in abundance for the sake of the nutritive salts they contain; the vegetables rich in compounds of iron, such as spinach, oats, beans, and lentils, are to be recommended; fruit, raw or cooked, should also be taken in considerable quantities. The evening meal¹ should not be too succulent or too plentiful; it may best consist of soft-boiled eggs, an omelette, or milk. Alcoholic beverages should be avoided or taken in minimal quantities; only as a stomachic a glass of beer or of light wine may be recommended.

Chlorotic patients should even at their first breakfast¹ have a meal rich in albumin, such as a consider-

¹ It must be remembered that these dietetic directions are for German and Austrian middle-class people, the arrangement of whose meals differs from ours considerably. The usual meals and hours are: Early breakfast, coffee and rolls, at 8 or earlier; second breakfast, a more substantial meal, at 10; mid-day dinner, the principal meal, at 1 or 2 P.M.; afternoon coffee, at 4; supper at 8 P.M.—TR.

able helping of meat, or a beefsteak, with rolls, butter, and tea or coffee. Milk should be taken in small quantities only, not more than a pint to a pint and a half daily; only when solid food cannot be tolerated should milk be given freely. Beer and wine are often of value in chlorotic girls from their stimulant action on digestion and circulation. Half an hour's rest before and after meals is useful.

For the bill of fare of these patients I recommend especially: Roast beef and veal, underdone beefsteak à l'Anglaise, ham; roasted venison, hare, partridge, grouse, fieldfare, hazel-hen, ptarmigan, pheasant, chicken, pigeon, turkey, oysters; asparagus, cauliflower, and spinach. For variety, fish or shellfish may occasionally be taken. Sweetbread in soup or with sauce forms a very delicious and easily digestible dish.

Kahane recommends for chlorotic patients the systematic use of Bavarian beer, to the amount of about two pints daily; it should, he says, be a beer rather dark in tint, full-brewed, rich in malt, but containing a comparatively small proportion of hops, alcohol, and carbonic acid. Jaworski has recommended a dietetic iron-beer, containing 4.7 per cent. of alcohol and from 0.0317 to 0.0644 per cent. of iron.

When girls are at the same time anæmic and very thin, fat-containing foods must be taken in abundance, such as milk, butter, and cream; also large quantities of carbohydrates. Farinaceous foods, rice, potatoes, arrowroot, sago, tapioca, oatmeal, barley meal, carrots, turnips, sweet fruits, grapes, dates, pippins, plums, pears, and preserved fruits—all these must appear at table more frequently than usual; beverages, in addition to milk, that are suitable are chocolate and cocoa, Bavarian beer, and sweet, heavy wines.

The diet-table of such thin chlorotic patients should be as follows:

First breakfast, 7.30 to 8 A.M.: Coffee or cocoa with milk, or a pint of milk, white bread and butter, honey. Second breakfast, 10 A.M.: Half a pint to a pint of milk, egg and bread and butter, or sandwiches of sausage, ham, or roast meat. Mid-day dinner, 1 A.M.: Soup, roast meat with vegetables and potatoes, or fish may take the place of the soup, sweets to follow. Afternoon, 4 P.M.: Coffee with milk, or a pint of milk, with bread and butter. Supper, 7.30 P.M.: A plate of meat with accessories. Evening, 9 P.M.: A glass of milk.

In the treatment of the anaemic form of obesity, to which chlorotic patients of the better classes are subject, in consequence of sedentary habits and overfeeding, the diet must be so arranged that albumins predominate, whilst carbohydrates should be given sparingly, and as little fat as possible. As the average quantities of the food elements required in such cases, I suggest, 200 grammes of albumin, 12 grammes of fat, and 100 grammes of carbohydrate.

The quantity of fluid taken must be as small as possible, since the deprivation of water may result in a proportionate increase in the solid constituents of the blood, and thus increase its haemoglobin richness.

The amount of physical exercise taken by young girls at this period of life must vary according to the circumstances of each individual case. In general, we may recommend for them much active movement, especially in the open air, in order to counteract the effects of sedentary habits and confinement in close rooms. Chlorotic patients must, however, be careful to avoid overdoing their exercise, and in some cases it will be necessary to limit the amount of this very strictly. In severe cases of chlorosis, Nothnagel, Hay-

em, and other authorities recommend complete rest in bed for from four to six weeks. This rest-cure can be carried out as far as possible in the open air, and can be combined with systematic massage and the use of passive movements.

I have drawn up the following diet-table for obese chlorotic patients:

	Quantity in Grammes.	Contains of		
		Albumin.	Fat.	Carbohydrates.
Morning:				
Beefsteak	100	38.2	1.7	....
A cup of tea.....	150	0.45	....	0.9
White bread	30	2.9	0.2	18.0
Mid-day:				
Meat soup	100	1.1	1.5	5.7
Roast meat	200	76.4	3.4	....
Vegetables	50	0.8	0.2	4.2
White bread	50	4.8	0.4	30.0
Light wine	150	....	....	1.0
Afternoon:				
A cup of coffee.....	120	0.2	0.67	1.7
White bread	25	2.4	0.2	15.0
Evening:				
Roast meat	200	46.4	3.4	....
Vegetables	25	0.4	0.1	2.1
Wine	150	....	....	1.0
White bread	30	2.9	0.2	18.0
Total	1380	206.97	11.92	97.6

Contains about 1300 calories.

For young girls at this period of life systematic gymnastic exercises are usually valuable, not only for strengthening the muscular system and improving the physique during these years of growth, but also for assisting the functions of respiration, circulation, and digestion. Beginning with the simplest and easiest exercises of chamber gymnastics, the girl gradually proceeds to more difficult and elaborate exercises and to the use of medico-mechanical apparatus.

The clothing of young girls at the time of the menarche must receive attention to this extent, that all articles of clothing should be rejected which increase the tendency already existing to hyperæmia of the genital organs or offer any hindrance to the circulation in general. Above all, the physician must take his part in the contest so long and so vainly urged against the corset. But further, all tight clothing, such as restricts the freedom of movement of the thorax and the abdomen, tight collars, and tight garters—all these must be forbidden; moreover excessively warm under-clothing, of the lower extremities especially, which may stimulate the genital organs, must also be prohibited.

As regards the night hours, a thick feather bed is unsuitable. The young girl should sleep on a hair mattress, and the bed clothing should be light. Eight to nine hours sleep is sufficient; in the words of the English proverb, "early to bed and early to rise, is the way to be healthy, and wealthy, and wise."

To live by rule, with regular hours of work and suitable pauses for rest, is of great importance. Among the well-to-do classes also care should be taken that the adolescent girl takes moderate physical exercise for several hours daily; she should go for a good walk, and not spend hour after hour recumbent upon a sofa in idle reverie. Sitting for too long a time, whether engaged in sewing or at the piano, is harmful; working at the sewing-machine is permissible for short periods only, and is indeed at this period of life better altogether avoided. Bicycling is also an unsuitable exercise at this age and readily leads to masturbation. Lawn tennis and croquet, on the other hand, are very suitable active open-air games; in winter, skating may be indulged in if proper precautions are taken against

chill; in summer, swimming and rowing. The reading of light literature should be kept under supervision; equivocal novels, such as may give rise to erotic reverie and sensual excitement, must be strictly forbidden. A watch should be kept for any indications of the habit of masturbation; and if the habit exists, appropriate measures should be taken.

Hydrotherapeutic procedures and baths are of great hygienic and therapeutic importance for girls at the menarche. In healthy girls at this period of life, a cold sponge-bath lasting one or two minutes, the temperature of the water ranging from 10° to 20° C. (50° to 63° F.), taken either on rising in the morning or immediately before going to bed, is a valuable means for hardening the whole body; equally useful are cold shower-baths, lasting from a few seconds up to half a minute. If the girl is somewhat anæmic, it will be well for her to take a glass of warm milk or a cup of tea half an hour before the bath, in order to guard against too great an abstraction of heat. Cold bathing in rivers, when available, may also be recommended. In cases in which a considerable degree of anæmia or chlorosis is present, cold baths and every form of strong mechanical stimulation by the use of water, douches and the like, are to be avoided, since we have to fear both excessive abstraction of heat and overstimulation of the nerves. In such anæmic and chlorotic patients, either partial washing with lukewarm water or general lukewarm baths, the temperature of which may be gradually and cautiously lowered, either on rising or at bedtime, have a refreshing and stimulating effect.

In girls who are in other respects healthy, but in whom the menarche is delayed, and in whom menstruation, when begun, has been scanty and irregular, cold sitz-baths of short duration, the abdomen being

simultaneously douched from a considerable height, or cold shower-baths in combination with powerful abdominal douches, are often of value.

Recently, hot air and vapor baths have been especially recommended for girls suffering from chlorosis, at first, by Scholz and Schubert, in association with phlebotomy, but also without this. Kühne, for example, has seen the most satisfactory results follow the simple use of sudatory baths in cases of chlorosis; improvement was manifested by an increase in the corpuscular richness of the blood, an increase in the hæmoglobin-richness, and an increase in the body-weight. In cases of chlorosis, Traugott also has seen favorable results follow the use of hot-air baths and the consequent diaphoresis.

Still more recently Dehio and especially Rosin have recommended hot baths for girls suffering from chlorosis. In fifty cases of chlorosis, in which other methods of treatment had given negative results, Rosin gave three times a week baths at a temperature of 40° C. (104° F.), lasting at first a quarter of an hour, but later half an hour. After the bath, in those strong enough to bear it, a very short cold douche or cold sponging followed; then the patient had to lie down for an hour. The treatment was carried out for from four to six weeks. Each bath by itself had a notable refreshing effect in these patients, and at the end of the course most of the cases exhibited an improvement in all their symptoms, such as other methods of treatment had failed to produce.

The favorable influence exercised by these hot baths, as by steam bath-cabinets, light baths, sun baths, wet packing, and similar sudorific measures, may in part be explained by the dehydration of the system that is thus effected; whilst those who maintain the auto-in-

toxication theory of chlorosis may regard the dia-phoresis as a means for the elimination of noxious substances from the body.

Bathing in water aerated with carbonic acid may be recommended for patients suffering from anaemia and chlorosis at this period of life, for the reason that such baths can be tolerated at a lower temperature than baths of ordinary water. The natural mineral waters containing free carbonic acid, and chalybeate waters rich in carbonic acid, when used as baths, are effective principally in virtue of the carbonic acid they contain, which stimulates the skin; this stimulus being conducted by the nervous system from the periphery to the nerve-centres, is reflected thence, and by irradiation exercises a quickening effect on all the processes of nutrition. These baths are usually taken at a temperature progressively reduced from 32° C. to 25° C. (90° F. to 77° F.), and each bath lasts from ten to twenty minutes; they are in most cases taken every other day only. For young girls in whom the menarche is delayed, also for chlorotic patients with amenorrhœa and neuralgic manifestations, chalybeate peat baths are indicated, which influence the peripheral nerves by the exercise of a gentle yet considerable thermic stimulus. These chalybeate peat baths have further been shown to increase the haemoglobin-richness, the corpuscular richness, and the specific gravity of the blood, transitorily after each bath, but to some extent permanently also, a certain increase enduring after the course is over.

Young girls suffering from disturbances of their general health dependent upon a scrofulous or rachitic habit of body may with advantage be sent to brine baths, especially to such as are situated in the Alps or other mountainous regions. These weakly, lymphatic,

scrofulous girls, suffering from scanty or irregular menstruation, may also practise sea-bathing with advantage, especially at watering-places on the sea-coast, where the waves are powerful. In such cases, however, it is advisable in the first instance to take artificially warmed sea-water baths, before proceeding to actual sea-bathing.

If the sensibility of a chlorotic patient is so great that she can endure neither peat baths nor carbonic acid containing mineral water baths, we must add to the latter, in order to make their action milder, decoctions of chamomile, wheat bran, malt, and the like.

In cases in which nervous symptoms predominate, with an apathetic, melancholic frame of mind, aromatic herb baths are sometimes useful. For this purpose such herbs should be employed as contain a notable quantity of ethereal oils, such as sage (*salvia officinalis*), wild thyme (*thymus serpyllum*), hyssop (*hyssopus officinalis*), wild marjoram (*origanum vulgare*), rue (*ruta graveolens*), archangel (*archangelica officinalis*), levisticum (*levisticum officinale*). Equally useful are the balsamic pine needle baths, for which the fluid obtained by the distillation of pine needles (*pinus sylvestris*), freshly collected day by day, is employed.

As regards the climatic conditions suitable for adolescent girls suffering from the disorders of the menarche, from the nervous conditions associated therewith, and from chlorosis, residence either in the mountains or at the seaside is especially to be recommended. An altitude of about 1,200 metres (4,000 feet) is the most suitable, being that at which the peculiar characteristics of mountain climates are most fully developed. The influence of such a climate on

hæmatopoiesis has to be taken into consideration, as well as its special influence on the menstrual function.

Even though it cannot yet be regarded as fully determined whether the increase observed by Viault, Egger, and Mercier, in the corpuscular richness and hæmoglobin-richness of the blood in consequence of residence in a mountain climate, is lasting or merely transitory, yet it is certain that the hæmatopoietic organs are favorably influenced by such residence, and that the good results are augmented by the stimulating effect mountain air exercises on the appetite and the digestion. Lombard has moreover observed, that at a high altitude the menstrual flow is more abundant and dysmenorrhœa is less common. For young girls, therefore, suffering from irritable conditions of the heart, increased frequency of the pulse, or increased arterial tension, and for those also in whom the resisting power of the organism appears deficient, a visit to a mountain health resort situated amid forests may be recommended. For scrofulous girls a visit to the sea side is especially suitable. For the slighter forms of anæmia, a sea voyage, in which the benefits of sea air can be obtained more fully, and for a longer period, may be advised; but such a voyage is quite unsuitable for those suffering from severe anæmia or chlorosis.

Such very weakly, intensely anæmic and chlorotic patients should spend the winter in some southern health resort.

The skin, in which disturbances so readily occur at the time of the menarche, requires careful attention, all the more because it is precisely at this age that young girls have the greatest need of their personal charms. The skin of the face, which is often disfigured by comedones and acne, must be carefully guarded against the accumulation of sebum in the

sebaceous glands by sedulous washing with warm water and a good soap. If the seborrhœic process in these glands becomes at all severe, ordinary soaps are unsuitable, and a potash soap must be used, such as *sapo viridis*, or *spiritus saponatus kalinus*, which have great power of dissolving fats.

The best way of dealing with seborrhœa is, according to Spietschka and Grünfeld, the following: The washing is best effected in the evenings, when the skin will not again for many hours be exposed to the fresh air, to wind, or to dust. Pour into a basin about a pint of warm water and add from one to two teaspoonfuls of spirit of soap (equivalent to the *linimentum saponis* of the British Pharmacopœia) or as much soft soap as can be taken up on the end of a table-knife. The water is then stirred vigorously till a good lather is formed, and with the water and the lather the face is thoroughly washed. The skin must then be carefully dried, and thereafter it is well to smear it with some greasy material, such as boric vaseline, in order to prevent the plugging of the pores with dust, and to protect the sebum subsequently exuded from desiccation. On the next day the washing should be repeated only if the face has become covered with sebum within an hour or two after the first washing. If the exudation is less free, the eyes only should be washed with fresh water, whilst the rest of the face should not be wetted, but merely be wiped with a dry face towel lightly dusted with toilet powder, in order to remove any accumulation of sebum.

The skin of the genital regions must be carefully cleansed, especially in cases in which there is a tendency to hypersecretion of the sebaceous glands, to eczema, or to herpes progenitalis; subsequently it should be powdered, and pads of absorbent cotton-wool dusted

with toilet powder should be placed in the labial furrows.

It is of great importance that in girls at this time of life gynecological examination should be undertaken only in cases of the utmost need, and this restriction should be especially inflexible in the case of girls with a neuropathic predisposition. Instances have been observed in which a vaginal examination, the introduction of a vaginal speculum, or the use of the uterine sound, has determined the onset of a psychosis. Still more does what has been said hold true of local treatment in gynecological cases. Repeated passage of the uterine sound, cauterization of the cervix, and the manipulations of gynecological massage, make a very deep impression upon the mind of a girl, and give rise to morbid ideas and erotic storms, so that even in those with a powerful constitution, various neuroses, neurasthenic states, and even mental disorders may result.

If in such cases, especially in girls of a neuropathic temperament, gynecological treatment is quite indispensable, a single, though energetic, operative procedure is to be preferred to a number of successive, though taken singly less extensive, manipulations of and in the female genital organs. The importance of this proposition has been repeatedly established. Sänger, for instance, points out as a fact to be regretted that uterine cauterization with mild caustics is far too frequently undertaken; and Odebrecht, from the same standpoint, proclaims the advantage of a single curetting as compared with milder intra-uterine impressions repeated during a course of treatment lasting many months. On the other hand, the physician must bear in mind the fact, established by the record of a very large number of cases, that in women predisposed

to psychoses severe gynecological operations are apt to lead to the actual appearance of mental disorders, or to the exacerbation of mental disorders which have previously been very mild or have merely threatened to appear. Careful consideration is needed, on the one hand as regards the severity of the disease of the genital organs, and on the other as regards the resisting power, temperament, and constitution of the girl concerned, and in many cases a consultation between the gynecologist and the neurologist is expedient.

A very powerful influence on the physical and moral well-being of the girl at puberty is exercised by her domestic upbringing. The general truth of Goethe's saying, that the circumstances into which we are born exercise a determining influence on the whole life, being admitted, we have to remember that this applies with especial force in the case of girls.

The educational views which obtain at the present day among the upper ten thousand, are by no means calculated for the production of a woman healthy in body and sound in mind. From the time when the young girl becomes sexually developed, the claims which society makes upon her become pressing. Every day, by a number of stimuli, her curiosity and her desires are directed toward sexual matters. Visits to museums, picture galleries and theatres, the perusal of modern romances, the free mingling of the sexes in all places of amusement—all these combine to awaken prematurely an instinct to which the "old-fashioned" methods of education allowed a much more prolonged slumber. In other cases, the mother's supervision of the developing girl is hindered and rendered insufficient because the mother herself is claimed by her society duties and taken much away from her home. In addition, the young brain is overburdened with

mental work, the modern idea of the equality of the sexes in matters of love is instilled, and a desire is artificially evoked, and is matured by a certain idle vanity, to indulge the "natural" instincts—to manifest sexual passion and to indulge it to excess—and thus the modesty so natural and so becoming to young girls is completely lost. Nourished in such a soil, neurasthenic and hysterical states, disorders of menstruation and masturbation, cannot fail to flourish.

In these respects also a change is requisite, and a mode of upbringing must be inculcated from which everything likely to inflame the sexual impulse is removed. For the adolescent girl a systematic alternation of work and recreation must be arranged. From great entertainments where she will mix with young men, from theatres, evening parties and balls, the young girl at the time of the menarche, at the period when menstruation commences, must as far as possible be kept away, and such pleasures must be reserved for a more advanced stage of this period of development. Intellectual overstrain, the overtaxing of the young head, must be avoided; the acquirement of knowledge must take place gradually and slowly, and in a manner adapted to individual peculiarities. Intercourse with female friends also requires supervision in respect of the moral characteristics of these latter. Religious reverie must be avoided, but also to be avoided is the modern nihilism in respect of religion and good morals. Books must be carefully chosen in order that the imagination may remain pure and in order that girlish illusions may not be prematurely destroyed. Domestic recreations in the way of games, music, singing, painting, and other forms of artistic culture, are of importance for the development of a strenuous faculty for learning. Travel in regions where the scenery is beauti-

ful, forms a most valuable means for the ennoblement of the intellect and the emotions.

Additional matters demanding attention are, as already mentioned, the suitability of the diet, and proper physical exercise. All stimulating articles of food are to be avoided, the excessive use of meat is to be forbidden, and a sufficient mixed diet, containing both animal and vegetable substances, is to be prescribed. Tea and coffee should be taken as sparingly as possible, and alcoholic beverages must be absolutely prohibited. The regulation of the bowels is of great importance. Young girls should accustom themselves to evacuate the bowels every day at a fixed hour, the best time to adopt being either immediately on rising or just after breakfast. Constipation is very apt to lead to the production of irritable conditions of the genital organs.

We can point out as a happy instance of modern progress that the practice of certain physical exercises has actually become the fashion for young girls. Gymnastics, with or without apparatus, swimming, skating, and lawn tennis, involve a number of bodily movements advantageous for the health; and in connection with most of these the enjoyment of fresh air offers an additional favorable influence. Bicycling, however, at this period of life, is open to many objections, not only on account of the likelihood of direct injury to the genital organs now in course of development, but also on account of the impulse it produces toward onanistic manipulations.

Especial attention must be paid to the clothing, regarding which the requirements of fashion so often conflict with those of hygiene, the victory, unfortunately, in most cases falling to the former. The period of the menarche is indeed usually regarded as the

proper time for the young girl to begin wearing a corset, if it has not been worn before. In this connection M. Runge makes the significant remark: "As long as bodice and skirt form the two principal articles of woman's clothing, the corset or some similar article cannot be dispensed with. The vicious features in the corset are its constriction of the thorax, with the object of giving the woman a 'figure,' and the introduction into its substance of strips of whalebone or steel in order to give firmness to the figure. The harm done by the former feature, the compression of the abdominal viscera, the corset liver (lacing liver, constricted liver, Ger. *Schnürleber*), the movable kidney, etc.—all are so well known that they need not be particularly described. But the strong pressure from above has a deleterious effect upon the internal genital organs also, leading to passive hyperæmia and to displacements. The 'bones' of the corset take part in the compression, and they replace the functions of the muscles of the back. If a woman who has long worn a corset lays it aside later in life, she complains that she is no longer able to hold herself upright. In consequence of insufficient work the muscles of the back have become incapable of keeping the back straight. The corset, then, must neither constrict the body, nor must it contain 'bones.' An article of clothing analogous to the corset is, however, required for the support of the skirt and the petticoats that clothe the lower limbs. These latter are usually fastened by means of bands which encircle the body above the crest of the ilium. In order to give these bands a sufficient hold, this region of the body is compressed by the corset. The burden of skirt and petticoats is thus borne by a furrow, above the pelvis and below or in the region of the asternal or false ribs, which is in great part artificially produced.

All this is bad. In order to avoid the necessity for any constriction, the petticoats should be fastened to the corset, and this latter should be supported from the shoulders by means of shoulder-straps or braces crossing one another behind. No constriction of the thorax then occurs, and if the corset has suitable supporting pouches for the breasts, and the wearer is accustomed to hold herself erect, the figure of a well-formed woman thus attired is far from unpleasing, and is, above all, natural. If the weight of skirt and petticoats is too great to be borne by the shoulders, the burden can be divided, some being fastened to the corset, others tied round the waist. This method is less to be commended, but may be regarded as a permissible middle course. If chemise and drawers are woven in one piece, as in the 'combination' undergarment, there is one article the less to be attached to the corset. Recently a number of corsets and articles of clothing have been made in accordance with these principles.

"The growing girl, then, may wear a soft corset with shoulder-straps, made to measure, to which all the garments clothing the parts below the waist should be made to fasten. It must unfortunately be admitted that this rational mode of arranging the clothing cannot be adapted to the 'low dress' which etiquette demands on so many occasions for evening wear, since with the latter the shoulder-straps cannot be worn.

"It is most unhygienic for women to wear, as they so often do, drawers that are widely open. Both cleanliness and the need for an equable warmth demand that these garments should be closed between the thighs, not to speak of other reasons."

In order to diminish the sexual impulse in girls at the menarche, where this impulse has developed prematurely or is abnormally intense, and even in later

years with the same end in view, it is necessary, not merely that the diet should be suitable and non-stimulating, and that the educational environment should be satisfactory, but above all that there should be regular occupation and regular physical activity. Ribbing rightly calls attention to his experience in dealing with animals, that equally in the case of the stallion and of the mare, the whole of life may without difficulty be passed in complete abstinence from sexual gratification, provided that the diet is suitable, being neither too rich nor too meagre, and that the animal has regular occupation of a nature and degree adapted to its powers. In these animals a certain amount of disquiet, of restlessness, of sulky irritability, etc., may indeed be noticed at times, but these manifestations are to be overcome by mingled gentleness and firmness, aided now and again also by mild chastisement, but altogether without any severity. "Chastity," says Oesterlen, "is possible only when the mode of life is simple and regular, and is characterized by appropriate self-command and frugality. For this reason it is rarely encountered in palaces and similar places, in which from youth onward every one can do what he pleases; but just as little is it really practicable amid conditions of lack of culture, rudeness, and poverty."

From the point of view of education, what Moreau wrote a hundred years ago is of importance: "In the ordinary course of nature the young woman at the time of the first appearance of menstruation is still in full possession of those amiable qualities of blamelessness and chastity which we are accustomed to denote by the term *moral virginity*. To an honorable and pure-minded man this beautiful attribute of budding womanhood is much dearer and more estimable than physical virginity. By libertines only is the latter re-

garded as a most valuable possession, since it furnishes a powerful stimulus to their jaded imaginations. But moral virginity and physical virginity are not always and necessarily associated, for either can be present in the absence of the other. Physical virginity may be destroyed by divers forms of violence, and yet moral virginity may remain pure and uninjured amidst its ruins. Thus the two are widely different one from the other, widely different also are they in value and significance."

What Eulenburg says regarding the prophylaxis of sexual neurasthenia in general is true regarding the sexual life of the girl at this period of life. "What is needed," he writes, "is the control of educational influences with these ends in view, that, on the one hand, the sexual excitability of developing youth shall be diminished and kept within bounds, and that nevertheless, on the other, the urgently needed enlightenment shall be afforded to the young people at the proper time and in a suitable form. How these aims are to be effected cannot be explained in generally applicable propositions. It is a matter which must be left to the tact of the parents and of other members of the family, who will be guided by the insight they have acquired into the mental life of those concerned. * * * Children inclined to onanism must be carefully supervised by day and by night; they must be protected from all stimulating things and from bad company; in boarding-schools it is the common dormitories that require the most strict, most careful, and most continuous control. In the case of auto-onanists, female as well as male, we must inquire into the possible existence of local stimulating influences, among which, in both sexes, oxyuris must be mentioned—but in truth it is rare for such local conditions to

be the exciting cause of masturbation. A healthy mode of life in respect of clothing, sleep, and diet, and the systematic practice of bodily exercises to the point of considerable fatigue, are the most effectual means of counteracting the noxious propensity to onanism."

A high degree of freedom permitted to girls from a very early age is, as Rousseau already maintained, by no means favorable to the preservation of virginity.

A wise mother or a wise instructress can do much toward the preservation of physical and moral virginity, by enlightening her daughter or pupil at the right time and in a proper manner as to the nature of the sexual processes, and their significance for the whole life of woman. Ignorance in this respect, equally with pseudo-knowledge, entails many dangers. I regard it as indispensable that the adolescent girl should in good time learn from her mother the nature of menstruation, lest she should first receive enlightenment in an unfitting manner from some more experienced female friend. The mother should explain that the impending flow of blood is a natural process, unattended by danger, but indispensable to the sexual life, and a characteristic part of the process of "growing up."

The knotty and important topic of how the young girl may best receive sexual enlightenment from her mother, is discussed by E. Stiehl in her notable work *A Maternal Duty*.¹ The authoress points out that this enlightenment must not take place suddenly and without apparent motive, but that the mother must in a gentle and gradual manner introduce to her child the secrets of nature. A beginning may be made by teaching the child to observe the nature and growth

¹ *Eine Mutterpflicht.*

of plants; then she may be led to interest herself in the family life of animals; and thus an easy way is found to answer the questions connected with reproduction—to answer them in a manner at once true and befitting.

Let the mother indicate to her child the methods employed by nature for the preservation of the life of the young plant; let her demonstrate in a flower the stamens and the pistil as male and female organs respectively; and let her explain how when the pollen-grain reaches and fertilizes the tiny ovule in the ovary, this ovule becomes capable of development into a large seed containing an active rudimentary plant, which latter itself enlarges to become a new full-grown specimen of its kind. The opportunity may then be seized to draw attention to the resemblance between the little ovules in the ovary of the minute ova by means of which all animal life reproduces its kind. Proceeding farther, an earnest and thorough introduction to the sanctity and responsibility, the perils and duties, of the sexual life, is urgently required by the young girl before she proceeds either to marriage or to an economically independent mode of life.

Not only in America and England, but now also in Germany, there exist excellent books which may actually be put into the growing girl's own hands, by means of which she will be introduced in an intelligent manner to a knowledge of the method of reproduction in the human species.

Often enough, when the mother is lacking in intelligence or sympathy, it will be the duty of the physician to give this enlightenment to the young girl. The interpreter of such tidings at the time of love's dawning will be the family doctor, to whom the girl and her family have been confidently accustomed to turn for information regarding the bodily state and well-being.

He is accustomed to remove many a veil without any offense to maidenly modesty. Many sexual disorders and much sexual aberration may thus be prevented.

Certain definite hygienic rules must now be prescribed. First of all, the strictest cleanliness must be observed, not only in the intervals, but also during menstruation. The prejudice against changing the underlinen during the flow must be overcome, and care must be taken that at this time the external genitals are washed twice daily with water at a temperature of 26° C. to 28° C. (about 80° F.), and a wad of absorbent cotton-wool or a piece of clean linen (sponges are not to be used for this purpose); any article of underclothing that becomes soiled with blood must be changed. Most useful are the so-called "sanitary towels," made of sterilized absorbent cotton-wool, fastened to a linen band which surrounds the waist, or simple pads of absorbent material may be used, kept in place by means of a bandage. During menstruation, full baths, warm or cold, are to be avoided, likewise long walks, riding, long journeys by rail, gymnastics, with or without apparatus, skating, lawn tennis, and bicycling; dancing, above all, must be prohibited, since it involves a combination of several noxious influences—the very active movement, which produces hyperæmia of the genital organs, sexual excitement, loss of sleep, long hours spent in close rooms, prolonged voluntary retention of urine, and the risk of a chill.

Singing, also, must be discontinued during menstruation, since otherwise an injury to the voice is very likely to result. A certain limitation in respect of physical and mental activity is indicated as a general precautionary measure during menstruation, but this measure must not be pushed to excess, so that the habit is acquired of resting completely during the period,

passing the days on a sofa. The favorite practice, in cases of scanty menstruation, of taking hot foot-baths is to be rejected. At the conclusion of each menstrual period, however, a tepid bath should be taken. The knowledge we have now acquired of the rhythmical "menstrual wave" process (see p. 13 *et seq.*) points to the practical conclusion that the physician should not direct his attention to the actual menstrual period only, but also, and more than has hitherto been customary, to the premenstrual period, in which temperature, blood-pressure, and excretion of urea attain their acme; especially should this be done, with the aim of prescribing suitable hygienic precautions, in cases in which the menstrual discharge is very profuse or in which nervous manifestations accompany menstruation.

Important is it also for the physician to take precautions against the practice by young girls of unduly prolonged voluntary retention of the urine, resulting in overdistention of the bladder; also against the performance of very active movements and against powerful muscular efforts when the bladder is in a distended state. All of these are liable to result in displacements of the uterus.

During menstruation the diet should be sufficient, but free from stimulating elements. When the menstrual flow is greatly in excess, strong tea and coffee, wine, and beer should be forbidden; conversely, when menstruation is scanty, an invigorating diet is especially indicated, and the use of strong wines. According to the investigations of T. Schrader, in order to maintain the nitrogenous balance during menstruation, it is necessary to give the following daily diet, representing a heat value of 2,013 to 2,076 calories:

125–150 grammes of fowl.
100 grammes of butter.
125–140 grammes of white bread.
150 grammes of brown bread.
70–80 grammes of eggs.
600 grammes of coffee.
600 grammes of soup.
560 grammes of Seltzer water.
20 grammes of salt.

For chlorotic girls the following diet may be recommended during menstruation. Before rising a pint of milk should be taken slowly, in sips, during a period not exceeding half an hour; for the first breakfast (see note to p. 95, tea or coffee with an abundance of milk, a considerable portion of meat (roast beef, cold fowl, cutlets, or beefsteak; for the second breakfast, a tumbler of milk, bread, butter, and a couple of eggs; for midday dinner, a good helping of fresh meat so cooked as to be easily digested, green vegetables, potatoes, farinaceous pudding, stewed fruit, and a glass of burgundy or claret; at 4 P.M., coffee and bread and butter, or a tumbler of milk; at 7 P.M., a similar meal to the midday dinner, but lighter; no supper. In this diet-table, which represents a heat-value of about 2,200 calories, albumin and fat are present in abundance (182.8 grammes albumin and 763 grammes fat), but carbohydrates in small quantity only (176.9 grammes).

For those chlorotic patients who find it difficult to digest much butcher's meat, the necessary quantum of albumin must be supplied by increasing the amount of milk, soup, and the white varieties of flesh (chicken and the like), giving also a considerable amount of the more easily digested vegetables, with fruit, beer, and a little claret. For such cases Desqué has drawn up the following diet-table, representing 3,290 calories and containing 150 grammes of albumin, 110.7

grammes of fat, and 449.6 grammes of carbohydrate; meat is given once a day only:

- 7.30 A. M.—Half a pint of milk, 50 grammes roll, 10 grammes butter.
- 10 A. M.—300 grammes apples, strawberries, or cranberries, 50 grammes roll, 10 grammes butter.
- 12.30 P. M.—200 grammes of beefsteak, 100 grammes of macaroni, 300 grammes of bread, 400 grammes of spinach, 200 grammes of stewed apples or gooseberries.
- 4 P. M.—200 grammes vegetable-peptone-cocoa, 50 grammes roll, 10 grammes butter.
- 7.30 P. M.—200 grammes rice-broth, 500 grammes buttermilk, 100 grammes bread, 10 grammes butter, 200 grammes salad, 300 grammes uncooked pears, 40 grammes curds.

In cases of profuse metrorrhagia in girls, von Winckel recommends in addition to rest in the recumbent posture, a diet containing large quantities of fluid, and much easily assimilable albuminous nutrient material, all stimulating articles and those likely to cause nausea and vomiting being avoided. He gives the following diet-table:

- 7 A. M.—250 grammes of milk.
- 9 A. M.—250 grammes of bouillon, 1 egg, 20 grammes of brandy.
- 11 A. M.—250 grammes of milk.
- 1 P. M.—100 grammes of roast meat, 250 grammes of rice-broth with 5 grammes of somatose, and 150 grammes of claret.
- 3 P. M.—250 grammes of milk.
- 5 P. M.—1 egg, 20 grammes of brandy.
- 7 P. M.—250 grammes of bouillon or white soup with 5 grammes of somatose.

As a beverage in the intervals, weak cold tea is allowed. When the haemorrhage has ceased, the following beverages are suitable: oatmeal, cocoa, Pilsener beer (one pint daily), milk (2 to 3 pints daily), claret (a half bottle daily). For food, the lighter varieties of meat, 200 to 300 grammes daily, sweet-bread, pigeon, ham, nutrient and easily digestible vegetables, spinach, carrots, and pea-soup, may be recommended.

In cases of amenorrhœa or scanty menstruation, especially when due to anæmia or to underfeeding, mental excitement, or overexertion, warm baths at a temperature of 28° to 29° R. (90° to 92° F.), rubbing the body with wet towels, and warm sitz-baths, are of good service.

[NOTE: Although in this translation the English equivalents of the measures used on the Continent have as a rule been appended in parenthesis, this has not been thought necessary in the case of the diet-tables, since even in English works these are commonly stated in terms of the metric system. It may here be mentioned that, as regards fluid measures, 250 grammes (a quarter of a litre) is roughly equivalent to half a pint, an ordinary tumblerful or breakfast-cupful; and that, as regards solid measures, 30 grammes are equivalent to a very little more than an avoirdupois ounce.]

Menstruation

Menstruation is the name given to the process which manifests itself in the human female after the age of puberty by the discharge from the genital organs at regular four-weekly intervals of a muco-sanguineous secretion. This discharge is not merely the result of a local hyperaemic condition; but is the expression of a periodic excitation of the entire nervous system and blood vascular system, intimately related with the whole sexual life of woman; this excitation is itself dependent upon the process of ovulation, an incident in the series of manifestations that arise from the periodic undulatory movement in the vital processes of woman.

The Mosaic law regarded the process of menstruation as unclean in nature; the menstruating woman was unclean, and must be purified in a prescribed manner. In the fifteenth chapter of Leviticus, vv. 19-29, we read: "And if a woman have an issue, and her issue in her flesh be blood, she shall be put apart seven days: and whosoever toucheth her shall be unclean until the even. * * * Every bed whereon she lieth all the days of her issue shall be unto her as the bed of her separation. * * * But if she be cleansed of her issue, then

she shall number to herself seven days, and after that she shall be clean. And on the eighth day she shall take unto her two turtles, or two young pigeons, and bring them unto the priest, to the door of the tabernacle of the congregation."

In a similar manner the adherents of the faith of Islam regard a menstruating woman as unclean.

This view is found also in the earliest medical writings, alike in the early Indian book of Susruta and in the later writings of Hippocrates, and it persists to the present day in the use of the expression "monthly purification." Susruta teaches that in India menstruation begins at the age of twelve, and recurs monthly, the flow lasting three days. In the Jewish Talmud it is asserted (see *La Médécine du Talmud*, by Dr. Rabbinowicz) that menstruation begins as soon as the girl has two hairs on the pubic region, or at the age of twelve, even in the absence of any growth of the pubic hair. The menstrual blood is quite peculiar in its characters. Thus, Raschi relates, the mother of the King of Persia exhibited sixty varieties of blood, and among them Rabba was able to detect which was the menstrual blood. According to a rabbinical authority, a woman can become pregnant as soon as she has completed her twelfth year. As signs of puberty, Rabbi Jossé mentions the appearance of a fold beneath the nipple, Rabbi Akiba, the erection of the nipples, Rabbi d'Azai, the appearance of a dark areola around the nipples, Rabbi Jossé, the recession of the nipple under pressure followed by its gradual protrusion when the pressure is removed, also the softening of the mons Veneris (in consequence of the deposit of fat in its substance). As prodromal signs of the first appearance of menstruation, the Talmud mentions, pain in the region of the umbilicus and in the uterus, flatulence,

shivering, white flux, heaviness in the head and the limbs, and nausea.

The blood discharged during menstruation has certain peculiar properties. It is always fluid, and rarely contains fibrinous clots, it is always mixed with a larger or smaller quantity of mucus, which gives it a sticky character; the reaction is alkaline, the smell characteristic. Only when the bleeding is very profuse are coagulated masses evacuated. On microscopical examination of menstrual blood, we detect erythrocytes and leucocytes, the proportional number of the latter being greater than in pure blood; there is an admixture also of epithelium from the genital mucous membranes, cylindrical cells from the uterus, flattened cells from the superficial layers of the stratified scaly epithelium of the vagina, also various micro-organisms and granular detritus. At the beginning of each menstruation, the admixture of mucus is greatest, so that the discharge sometimes has the appearance of blood-stained mucus; but during the height of the discharge the consistency is almost that of pure blood. The quantity of blood lost at each period is said to vary from 90 to 240 grammes (about 3 to 8 fluid ounces); but in tropical climates the average is said to be 600 grammes (20 ounces).

Both the quality and the quantity of the blood are subject to great variations. Thus, for instance, Bouchardat estimates the solid constituents at 99.20 per mille, Vogel at 161 per mille, and Simon at 215 per mille. The amount of blood discharged during menstruation depends upon the temperament, the constitution, and the occupation of the woman concerned. It is greater in vivacious brunettes than in phlegmatic blondes, greater in southern women than in those dwelling in the north, greater in town dwellers than in women living in the

open plains, greater in those whose mode of life is sedentary than in those engaged in some active occupation.

Similar considerations apply with regard to the duration of each period. The mean duration is in the great majority of cases from four to five days, being generally the same in successive periods in the same individual; in exceptional cases the flow may last a week or more. Menstruation lasting more than eight days must be regarded as abnormal.

Krieger has collected data relating to the duration of the individual periods. He found the duration constant in the great majority of cases, *i.e.*, 93.285 per cent.; but variable in a small minority, *i.e.*, 6.715 per cent.

The periods in which the duration was regular did not always last precisely the same number of days, the duration in many cases being 3 to 4 days, 5 to 6 days, etc.; but the same duration recurred regularly at each successive period, so that all these instances must be reckoned among the periods of regular duration. The duration must be regarded as irregular or variable in those cases in which the variation was from 2 to 4 days, 3 to 8 days, etc. Sometimes a regular three-day or five-day period becomes transformed into an eight-day period; or conversely an eight-day period into a four-day period.

The interval between one menstruation and the next (the period that elapses, that is to say, between the commencement of one period and the commencement of the next) is in the great majority of cases twenty-eight days. The recurrence in many women is extraordinarily exact, not merely as regards the day, but even as regards the hour of the day. The twenty-eight-day type of menstruation is found in about 70 per cent. of the cases; in the remainder, the thirty-day type is most frequent, and next to that the twenty-one-day type. The periodicity of

menstruation in any individual may, however, be very irregular.

The amount of blood lost and the duration of the flow are less in strong, healthy women, leading an occupied, active, and regular life, especially in country-women and in women who are poor and chaste, than it is in delicate, weakly women, leading a sedentary life, whose diet is abundant and stimulating, and who are accustomed to an ultra-luxurious and enervating existence. In nuns, for example, the quantity of the menstrual discharge gradually declines; shortly after their entrance into the cloister, various irregularities are apt to occur, but ultimately the flow becomes exceedingly scanty and lasts for a single day only. Climate also has a great influence, for in hot countries women usually menstruate very abundantly, whilst in cold countries the flow is scanty, and often appears only in the warmer months of the year. Of the Lapp and Samoyede women this was already reported by Linnæus and Virey. Tilt further relates that Eskimo women menstruate only during the summer months, and even then scantily. In southern France, according to Courty, the quantity varies from 120 to 240 grammes (about 4 to 8 ounces); but it may rise to 300, 350, and even 500 grammes (about 10, 12, and 16½ fluid ounces). In the tropics, severe menorrhagia is said to be common; and the fact was already known to Blumenbach, that women of European descent born in the tropics not infrequently succumb to haemorrhage during childbirth.

By menorrhagia we understand the occurrence of typical discharges of blood from the uterus, occurring at more or less regular intervals and differing from normal menstruation in respect either of the greater intensity or of the longer duration of the haemorrhage; whereas by metrorrhagia we understand the occurrence

of atypical discharge of blood from the uterus, which is related to menstruation neither in respect to its causation nor in respect to the time of its appearance.

Menorrhagia may be due to local changes in the genital organs, to organic diseases of other organs, and to general diseases.

Local changes which may give rise to menorrhagia are, active hyperæmia and passive hyperæmia (hyperæmia from engorgement) of the genital organs, such hyperæmia being itself due to sexual excitement, especially when ungratified, to violent physical exercise, or to chill during menstruation ; menorrhagia is also liable to occur when the abdominal circulation is disturbed by extreme obesity or by the presence of tumors, also in connection with endometritis, uterine myomata, erosions of the cervix, etc. Diseases of organs other than those belonging to the reproductive system which are especially likely to give rise to severe bleeding are, disease of the heart, such as valvular incompetence, lung disease, and nephritis. General diseases in which menorrhagia may occur are, anæmia, chlorosis, hæmophilia, scurvy, scarlatina, cholera, smallpox, influenza, and obesity.

Through severe loss of blood in menorrhagia, whether the bleeding be sudden and profuse or more moderate but long continued, a condition of chronic anæmia results, with all its threatening consequences to the health and the life of the woman affected. She becomes pale and weak, unfitted for any great physical or mental exertion, and is liable to attacks of cardiac enfeeblement and to fainting fits ; in some cases degenerative changes ensue in the cardiac muscle.

Dysmenorrhœa is characterized by severe pain occurring before, during, and after menstruation. The pain is caused either by abnormally powerful contractions of the uterus or else by abnormal sensitiveness of that or-

gan. Abnormally powerful contractions are caused by various mechanical hindrances to the normal processes of menstruation; abnormal sensitiveness is due to inflammatory and congestive states of the uterus and its annexa or to a general increase of nervous sensibility.

Schauta, therefore, distinguishes a mechanical, an inflammatory, and a nervous form of dysmenorrhœa. Mechanical dysmenorrhœa is most frequently due to stenosis or flexion of the canal of the cervix in some part of its course from the internal to the external os, dependent upon malformation or flexion of the uterus, hyperplasia of the mucous membrane, chronic metritis, scarring resulting from operative procedures, uterine polypi, etc. In inflammatory dysmenorrhœa we have to do "either with an inflammatory process or with excessive tension of the intrapelvic organs, dependent upon abnormal distention of the blood vessels." To the same category belong ovarian dysmenorrhœa, and dysmenorrhœa due to inflammatory changes in the Fallopian tubes and to pelvic peritonitis. In nervous dysmenorrhœa, no anatomical cause is apparent, but the uterine contractions normally occurring during menstruation, and the normal congestive distention of the intrapelvic organs at that period, become extremely painful, in consequence of a morbid increase in the sensibility of the nervous system.

The influence of dysmenorrhœa on the general condition of the woman suffering from it is often a very potent one.

The normal undulatory course of the bodily temperature—which as Reinl has shown, undergoes a gradual rise until shortly before the appearance of the menstrual flow, gradually falls during menstruation, and continues to fall for a time after menstruation is over—undergoes a change in cases of dysmenorrhœa due to anteflexion of the uterus, parametritis, or salpingitis, inasmuch as in

These cases the acme of the temperature curve is reached actually during menstruation and the decline of temperature comes, not at the commencement of the menstrual flow, but often only after the flow has ceased. The curve of blood pressure and the curve indicating the excretion of urea are similarly affected in these cases.

As symptoms in other organs occurring in cases of dysmenorrhœa Schauta mentions "sensations of heat, coldness of the feet, retching and vomiting, cramps of the stomach and of the voluntary muscles, general disorders of nutrition, loss of appetite, strangury, constipation, dyspepsia, headache, and finally hysteria. As symptoms of the latter affection we may notice, anaesthesia, hyperæsthesia of certain parts of the abdomen, attacks of cramp, paralysis, uterine cough, hiccough, spasm of the glottis, and epileptiform seizures. The repeated severe attacks of pain may seriously disturb the nervous system, leading to the appearance of general neuroses and psychoses. Frequently we observe, as a peculiar accompaniment of dysmenorrhœa, changes in the fulness of the blood vessels of the face and also in other regions of the skin, in consequence of vascular paralysis. In other cases, actual effusion of blood occurs, and, as a sequel of this, deposits of pigment; and the semicircles beneath the eyes may become so dark as to look as if they had been artificially tinted (Macnaughton Jones). In one case, during menstruation periodic swelling of the gums was observed (Regnier). Finally, in association with dysmenorrhœa, various forms of neuralgia, changes in refraction, and slight attacks of neuritis and retinitis may occur."

One of the commonest symptoms and sequelæ is headache, sometimes in the form of hemicrania, which may be associated with dyspeptic manifestations, sometimes diffused over the whole surface of the skull.

*h. efflux
symptom*

Dyspepsia is a very frequent associate of dysmenorrhœa. Thus we meet with pain and tenderness in the gastric region, nausea, vomiting, and also cardialgia. Sometimes the liver becomes enlarged and tender on pressure; in many cases also jaundice is witnessed.

Gebhard refers to another phenomenon which may be classed under the head of dysmenorrhœa, from the character of the pain that is experienced, even though this pain is not felt at the menstrual periods, but in the intermenstrual epoch. This is the so-called intermediate dysmenorrhœa (intermenstrual pain, Ger. *Mittelschmerz*). In the character of the localized pain, intermediate dysmenorrhœa closely resembles ordinary dysmenorrhœa; it recurs often with precise regularity on certain days during the intermenstrual interval.

Croom distinguishes three forms of intermediate dysmenorrhœa; that in which there is no discharge at all from the uterus, that in which there is a sanguineous discharge, and that in which there is a clear watery discharge. The first form he attributes to asynchronism in the processes of ovulation and menstruation; the second form, to endometritis with disintegration of the mucous membrane; the third, to a kind of hydrops tubæ profluens (profluent dropsy of the Fallopian tubes—hydrosalpinx in which the fluid accumulates in the tube, and at a certain stage of its accumulation flows into the uterus). Cases of intermediate dysmenorrhœa are somewhat rare, if we eliminate the cases in which pains occur in the intermenstrual epoch in consequence of disease of the uterine annexa. Inflammatory manifestations may be discovered in nearly all typical cases of intermediate dysmenorrhœa.

Long-continued dysmenorrhœa may give rise to numerous hysterical troubles, general convulsive seizures, local muscular spasm and paralysis, hiccough,

spasm of the glottis, uterine cough, twitching and spasm of various groups of voluntary muscles. In some cases we see fully developed epileptic convulsions, with complete loss of consciousness and immobility of the pupils. Finally, psychoses may arise in association with dysmenorrhœa.

In cases of pathological changes in menstruation, a carefully arranged hygiene at the menstrual periods is of importance, both for prophylactic and for therapeutic purposes, and in this connection I may refer to what I have written in the section on *Hygiene During the Menarche*. In cases of dysmenorrhœa a certain amount of repose and precaution are needed during the flow, with avoidance of chill, scrupulous cleanliness, and regulation of the bowels. In cases of amenorrhœa we must prescribe attention to the general nutrition by means of an easily digested robortant diet, as much fresh air as possible, and systematic bodily exercise. In these cases, bicycling, lawn tennis, and suitable gymnastics are often of value; also baths, in the form of warm general baths, hot sitz baths, and hot foot baths.

Vicarious Menstruation

In cases in which, in consequence of morbid conditions of the uterus, the ovaries, or the organism as a whole, the menstrual flow has at the time of the menarche either failed entirely to appear or been exceedingly scanty, haemorrhages from other organs have since ancient times been witnessed, and these haemorrhages have been regarded as vicarious menstruation. The congestion that occurs during menstruation is not limited to the genital organs, and when the flow of blood from the uterus fails to occur, the organism seeks another outlet, in order to restore the disturbed equilib-

rium of blood distribution, and vicarious haemorrhages take place from the mouth, the nose, the intestines, the anus, the gums, the mammae, the ears, and the lungs; or haemorrhages occur in the brain, the nerves, or the eyes.

Although it must be admitted that confusion has often occurred between vicarious menstruation and haemorrhages dependent on pre-existing genuine organic disease, such as haemoptysis due to pulmonary tuberculosis, or haematemesis due to gastric ulcer, still the existence of a true vicarious menstruation must be regarded as fully established.

In cases in which menstruation is in abeyance, we sometimes witness, instead of vicarious haemorrhages, the occurrence of non-sanguineous vicarious discharges from various mucous membranes. Thus, vicarious leucorrhœa is seen, especially in chlorotic patients, in whom, from the time of the menarche onward, such a discharge may occur every month, instead of the delayed menstruation. Similarly, vicarious diarrhoea and vicarious salivation have been observed.

THE SEXUAL IMPULSE

By the term *sexual impulse*, we understand the impulse shared by women and by men toward intimate physical contact and sexual intercourse with individuals of the opposite sex. In the child this impulse slumbers, to awaken at the menarche with the onset of puberty, to increase slowly at first, and then more rapidly, after the manner of an avalanche, until it becomes a powerful passion, dominant throughout the active sexual life of the woman, and it may even continue far beyond this period. The proper aim for whose attainment the sexual impulse in woman strives is by no means (as is asserted in some quarters) the

fulfilment of "the impulse toward motherhood," but is merely the complete satisfaction of sensual passion by intercourse with the male. Still, the sexual impulse is often satisfied by the minor degrees of sexual gratification in the form of the mutual contact, so agreeable to the sense of touch, of portions of the body, and even by the play of imagination and illusion under the dominion of love.

In the sexually mature woman, the sexual impulse always exists, though its strength varies in accordance with individual inheritance, with physical and mental condition, and with external circumstances, though its manifestation may be repressed by force of will.

According to the general opinion, the sexual impulse is not so strongly developed in women as it is in men. Hegar, Litzmann, Lombroso, P. Müller, and many others, assume that the sexual sensibility of women is less than that of men; Fürbringer is inclined to attribute the characteristic of sexual frigidity to the great majority of German wives. I do not believe that this view, of the slight intensity of the sexual impulse in women in general, is well grounded, and can admit only this much, that in adolescent girls who are inexperienced in sexual matters, the sexual impulse is less powerful than in youths of the same age who have undergone sexual enlightenment. From the moment when the woman also has been fully enlightened as to sexual affairs, and has actually experienced sexual excitement, her impulse toward intimate physical contact and toward copulation is just as powerful as that of men. According, however, to the dominant artificial conditions, man assumes it as his right to give free rein to his sexual desires and to gratify them without regard to consequences, whereas woman, narrowly confined within the boundaries imposed by law and

convention, cannot so readily yield to her inclination in the direction of physical love, and must forcibly control that inclination. Moreover, a powerful check on the free indulgence of the sexual impulse is imposed on woman by the consequences of such indulgence, consequences which exist for woman only.

I may further indicate as differential characteristics, that in woman the sexual impulse is more accessible to voluntary control than it is in man, the ardor of female sexual passion is more readily diminished than that of the male; and again that in the female the gratification of the sexual impulse is less narrowly restricted than in the male. Excessive sexual gratification on the one hand and suppression of sexual desire on the other are, generally speaking, less harmful to the female organism than to the male. In these differentiæ is to be found, in my opinion, the influence which determines the type of sexuality in the respective sexes.

Hegar maintains that under the term *sexual impulse* two distinct conceptions are confounded: First, the impulse toward copulation, the desire of carnal union with a member of the opposite sex; secondly, the impulse toward reproduction, the desire for children. At the same time, this author admits that it is questionable if we can properly speak of an impulse toward reproduction, when reproduction is merely a consequence of copulation; in the case of civilized man, at any rate, so much reflection is connected with the idea of reproduction that it can hardly be proper to speak of anything of the nature of an impulse. In the case of woman, the expression is less unsuitable, since in woman special organs exist for the maintenance of the ovum after fertilization, and these organs may perhaps lead to the production of this peculiar form of mental activity.

'According to Darwin, a comparatively less intensity of sexual desire is common to the females of all species of the animal kingdom. The female demands a prolonged courtship, and often endeavors for a considerable time to elude the male. In the lowest classes of the animal kingdom the female leads a separate existence as soon as she has been fertilized by the male, the sexual functions being thus subordinated to the maternal. Among birds at the pairing season the male is always the more passionate and active of the two, whilst the female commonly remains passive and occupies herself in building the nest. Among mammals, it is difficult to determine whether sexual feeling is stronger in the female than in the male; but it is certain that sexual relations are seldom long lasting, they continue in most cases only during the period of heat or rut, and at most only till the birth of the young.

From these phenomena witnessed in the animal kingdom, many naturalists have concluded that in females of the human species also, sexual sensibility and the intensity of the sexual impulse are less than in the males, and even that the sexual sense in general is but little developed in the female sex, or sometimes entirely wanting. The complicated apparatus which the primary and secondary sexual characters of the female combine to make up, exists, according to this view, not for the gratification of the sexual impulse, but for the fulfilment of the function of motherhood. "Love in women," says Lombroso, "is in its fundamental nature no more than a secondary character of motherhood, and all the feelings of affection that bind woman to man arise, not from sexual impulses, but from the instincts, acquired by adaptation, of subordination and self-surrender."

Mantegazza lays stress on the fact that in the female,

sexual desire is very rarely accompanied by pains analogous to those which occur in man, in whom sexual excitement manifests itself in painful tension of the testicle and the seminal vesicles, or in spasmodic, long-continued priapism.

Sergi writes to Lombroso: "The normal woman loves to be flattered and wooed by man, but yields herself to his sexual desires only like an animal at the sacrifice. It is well known how much pains must be taken, how many caresses must be expended, before a woman will yield with pleasure to a man's desires, and will share his sexual passion. Without the employment of these means, a woman remains cold and gives as little satisfaction as she feels. There are girls who are quite obtuse to the joys of love, and either resist energetically a man's approaches, or yield to him passively, without ardor and without enthusiasm. It is well known, also, that among the lower races of mankind, means are employed to stimulate the sexual sensibility in women, means that seem to us to amount to torture; and that the male, with the same end in view, undergoes the most painful operations, from which it is apparent that the slight sexual sensibility of women in these lower grades of civilization is fully recognized." And again: "If a normal woman marries for love, she hides that love deep in her heart, and even on the wedding-day exhibits no great sexual excitement; she often complains later that in her husband the love-fervor of the first days still continues; the very moderate sexual needs of the wife form a natural and most valuable check to the much more powerful passion of the male."

Saint Prospère expresses himself to a similar effect: "Women do not fall in consequence of the excessive power of the senses—in this domain they are overlords,

in striking contrast to men, whose weakest side is here. It is not by means of the senses that a woman is to be overcome; her weakness lies elsewhere—in her heart, in her vanity." And de Lambert wrote the epigram, "Women play with love, and yield themselves to love, but they do not abandon themselves to love."

Well known also is the saying of Dante:

"We know how speedily in women the fire of love is consumed
Unless eye and hand continually supply it with fresh fuel."

On the other hand, it is asserted in the laws of the Hindus that sexual desire in women can as little be satisfied or fed full as a devouring fire can be fed full of combustible materials, or as the ocean can be over-filled by the rivers that pour their waters into it.

As a rule, remarks Erb, it is believed that the sexual impulse is less intense in women than in men. This is true enough, he writes, as regards youthful and virgin individuals, who have not yet come into intimate contact with men, and in whom sexual desire and sensibility have not yet been directly excited; later, however, when sexual intercourse has been begun, a change usually takes place, and the sexual needs become active in women also, and demand satisfaction. It is well known that not a few women experience powerful and uncontrolled sensual inclinations, just like those of men. On the other hand, we must insist that quite a large number of women possess the so-called *naturæ frigidae*, and have no sensual inclination to sexual intercourse, to which they are either indifferent, or in some cases strongly averse, even regarding it with horror. This lack of the sexual sense in women is especially common in hysterical subjects, and Erb reports that he has encountered quite a large number of cases of this character. Whether in quite healthy women with

normal sexual impulse, complete abstinence from sexual intercourse, too often compulsory but sometimes voluntarily undertaken, is harmful in its consequences —this, says Erb, is a question very difficult to answer. Many such unfortunate women have assured him that they suffered severely in consequence of their enforced continence; the majority of these became neurasthenic or hysterical. The complication of purely physical influences with mental influences, increases the difficulty of the problem. Neurologists have observed women on whom continence was forced either during marriage or after its dissolution, who thereupon fell into a state of severe nervous exhaustion or nervous excitement, or suffered from threatening or even actually developed psychoses. That sexual abstinence is "absolutely harmless," as moralists and many physicians would so gladly believe, appears to Erb quite unwarrantable assumption.

"In the processes of reproduction," continues Erb in his discussion of this subject, "woman is the principal sufferer. With inhuman cruelty, nature has condemned woman to a far more difficult rôle than man in the intercourse of the sexes and in the preservation of the species; she is overpowered and forced by man, she is compelled to make the most severe sacrifices for the sake of the new generation, first when it is germinating within her womb, and later when it is entrusted to her care; and only too frequently she fails to find the respect and protection due to her for the performance of these functions! Compared with the sacrifices made by woman, the temporary continence which is all that is demanded from man will be admitted to be a small matter! It is fortunate that, as a rule, the young woman who has never come into intimate contact with the male, appears to be endowed by nature with a rela-

tively weak sexual impulse! This unequal and unjust distribution of the male and female rôles on the part of nature may be regretted, but it cannot be altered."

The modern advocates of the rights of women, who demand that in the sexual sphere also, woman should receive emancipation, oppose the view that in the male the sexual impulse is stronger than in the female, and also the view that whilst in the male the impulse is simply one toward sexual congress, in the female the determining motive to intercourse is furnished by the desire for motherhood. They complain of "the perverse repression in woman of the sexual impulse and its physiological gratification," since sexual energy and sexual sensibility are equal in intensity and identical in quality in the female and in the male.

Löwenfeld asserts that in the life of woman the sexual functions play a comparatively much greater part than in the life of man, woman's thoughts and feelings are, that is to say, much more powerfully influenced by sexual matters than those of men; but none the less he is of opinion that in the normal woman the desire for sexual satisfaction is on the average less keen than in the normal man. Distinctly greater in woman is the erotic element only, the need to love and to be loved after an ideal manner, which is excited by the reproductive glands just as much as is the simple sensual desire. Very frequently, manifestations of this ideal need are erroneously attributed to the sensual impulse, yet this latter may be entirely absent in cases in which the erotic element is strongly developed.

According to Löwenfeld, the sexual impulse is altogether wanting in young girls before the time of puberty, and in elderly women (in the case of the latter we consider this assertion most questionable); this lack of the sexual impulse persists in girls for an indeter-

minate time even after puberty, as long as they remain free from all experience of sexual stimulation. In this respect they offer a notable contrast to males of the same age. In normal girls, according to the same authority, erotic dreams and similar occurrences are entirely wanting, and specific sexual sensations therefore remain absolutely unknown to them; hence it follows that the sexual impulse cannot, properly speaking, arise in such individuals, and in so far as they experience any desire for sexual intercourse, it can only take the form of a craving for some enjoyment, the nature of which is entirely unknown. The absolute lack of the sexual impulse (complete frigidity) persists, according to Löwenfeld, in a not inconsiderable proportion of women even after their introduction to sexual intercourse—Effertz estimates that such complete frigidity is permanent in 10 per cent. of all women—and in a still greater proportion of women the sensual impulse never exceeds a certain minimal intensity (partial frigidity). It is probable that in the higher classes of society, inherited predisposition, education, and perhaps also higher intelligence, combine to diminish the intensity of the sexual impulse. In contrast with these women of frigid temperament, however, we meet with women, certainly in very limited numbers, whose sexual passions are extremely powerful, and whose needs no man can satisfy.

Hegar, who considers that the sexual impulse in women is seldom very powerful, draws the following conclusions in respect to the influence of sexual gratification, on the one hand, or of continence, on the other, on the duration of life and on physical and mental health: "As far as comparisons between married women and women vowed to celibacy (nuns and members of other celibate religious orders) justify any conclu-

sion, sexual activity and inactivity, respectively, would appear to have little influence on the duration of life. Comparisons between married and single women show, indeed, that the gratification of the sexual impulse and the processes of reproduction are distinctly injurious when experienced before the attainment of complete sexual maturity. In married women up to the age of thirty, in some countries even up to the age of forty, the mortality is greater than in unmarried women. The notably smaller mortality of married women, as compared with unmarried, after the age of forty, is usually explained as the result of the complete fulfilment of the genital functions. It may, however, find a truer explanation in the selection effected by marriage, especially when we take into consideration that from the women thus selected the weaker individuals have been previously weeded out by the processes of reproduction.

"The lesser mortality of married men from the age of twenty upward is to be explained by the selection of the fit which occurs in marriage, by the smaller proportion of marriages among men engaged in hazardous occupations, and by the deterioration in the quality of the unmarried which results from emigration. Still the directly favorable influence of marriage is undeniable, and, no doubt, the ethical factors of this institution have a beneficial effect, whereas the gratification of the sexual impulse hardly enters into the account.

"Suicide is certainly very little dependent upon repression of the sexual impulse, since all the motives arising out of the affairs of love play together but a small part among the causes of suicide.

"The beneficial influence of marriage in the prevention of insanity is in part apparent merely, since, in the selection exercised by marriage, those predis-

posed to mental disorder, and those in whom such disorder has already manifested itself, are, for the most part, already excluded. Still, as regards the male sex at any rate, the beneficial influence of marriage is undeniable, and consists principally in the favorable ethical factors of this state. In women, on the other hand, the advantage of marriage is doubtful, since the nerve centres and the nervous system as a whole are strongly affected by the processes of reproduction.

"Criminality in the married is comparatively less common than in the unmarried. In criminal assaults on young persons, repressed sexual impulse plays a part.

"Chlorosis is not in any way dependent on repression of the sexual impulse. A disease apparently analogous to chlorosis, occurring in unmarried women from twenty to thirty years of age, is dependent rather on mental causes, and is relieved by other means than marriage, especially by suitable occupation. Marriage and gestation are distinctly injurious in cases of true chlorosis.

"The satisfaction of the sexual impulse, and still more gestation, favor in women the origin and growth of tumors, give rise often to mechanical disturbances, and open the way for the invasion of toxic pathogenic germs."

Moll divides the sexual impulse into two components: The impulse toward intimate contact (in a sense both physical and mental) with a person of the opposite sex, which he calls the contrectation-impulse (*Kontrektionstrieb*) ; and the impulse to bring about a change in the genital organs, which he calls the detumescence-impulse (*Detumeszenztrieb*). The former impulse induces intimate physical and mental contact between the two persons concerned, the latter impulse

induces the local processes of copulation. In women, detumescence results from the passing off of local swelling and the release of nervous tension in the genital organs, with the discharge of indifferent glandular secretions, notably the secretion of Bartholin's glands, and perhaps also the secretion of the uterine glands. The intensity of the detumescence-impulse in women varies greatly in different individuals, these variations being more extensive than those occurring in the male. In some women the impulse toward intimate contact, the contrectation-impulse, is normal, though the detumescence-impulse is wholly wanting.

Runge defines the sexual impulse as the impulse which brings the sexes together. This impulse is subservient to an instinct, namely, the instinct of reproduction; that is to say, the sexual impulse induces the individual to perform actions which subserve the purpose of reproduction without the agent's being directly or chiefly concerned with this purpose.

The sexual impulse, as sensation, perception, and impulse, is, according to von Krafft-Ebing, a function of the cerebral cortex; a centre for the sexual sense has not as yet, however, been localized. The close relations which obtain between the sexual life and the sense of smell lead to the supposition that the sexual and the olfactory spheres of the cerebral cortex are in close proximity one with the other. The development of the sexual life has its beginnings in the organic sensations of the developing reproductive glands. A mutual dependence now arises between the cerebral cortex as a place of origin of sensations and perceptions, and the organs of generation. By anatomico-physiological processes these now give rise to sexual perceptions, representations, and impulses. The cerebral cortex, by apperceived or reproduced sensuous per-

ceptions, influences the organs of generation. This influence is effected by the intermediation of the centres of vascular innervation and ejaculation, which are situated in the lumbar enlargement of the spinal cord, and are certainly in close proximity one with the other. Both are reflex centres.

The psycho-physiological process embraced in the conception of the sexual impulse is, according to von Krafft-Ebing, constituted in the following manner:

I. Of the central or peripherally aroused perceptions.

II. Of the pleasurable sensations associated with these.

Hence arises the impulse to sexual satisfaction. This impulse becomes stronger in proportion as cerebral excitement, consequent on appropriate perceptions and the working of the imagination, strengthens the intensity of these pleasurable sensations. If the conditions are favorable to the performance of the sexual act by means of which satisfaction is attained, the continually increasing impulse finds expression in action; in other circumstances, inhibitory perceptions intervene, sexual excitement diminishes, the activity of the centre for erection is inhibited, and the sexual act itself is prevented. In the case of civilized humanity the ready action of such perceptions for the inhibition of the sexual impulse is necessary and decisive. On the strength of the impulsive perceptions the constitution and various organic processes have an important influence; on the strength of the inhibitory perceptions, education and the cultivation of self-control are powerfully operative.

In addition to mental influences, all forms of local irritation of the sensory nerves of the female genital organs and adjacent parts, by internal processes or ex-

ternal friction, serve to increase the strength of the sexual impulse. Among internal processes which stimulate the erectile centre by centripetal impulses must be included, the stimulus of the enlarged graafian follicle, stasis in various vascular areas of the genital organs in consequence of a sedentary mode of life, abdominal plethora from excessive consumption of food and stimulating drinks, and habitual constipation. External friction may be in the form of intentional manipulation, but it may be due to certain bodily attitudes or to the arrangement of the clothing.

In normally constituted individuals, the sexual impulse is by no means constant in its intensity. Apart from the temporary indifference resulting from sexual gratification, and apart from the decline in the impulse that occurs after prolonged continence, ensuing after a certain reactionary intensity of desire has been happily overcome, the mode of life has a very great influence. The town-dweller, who is continually reminded of sexual matters, and continually solicited to sexual intercourse, is in any case more subject than the countryman to sexual excitement. A sedentary and sheltered mode of life, a chiefly animal diet, the free use of alcohol and of spices, and the like, have a stimulating action on the sexual life. In the female, the sexual impulse is stronger just after menstruation. In neuropathic women this increase of excitement may occur to a pathological degree. Not infrequently also in the climacteric period, women are subject to sexual excitement due to pruritus, especially in those neuropathically predisposed. Magnan reports the case of a lady who was subject to matutinal accesses of intense erethismus genitalis. The same author writes of a young lady who since puberty had been subject to continually increasing sexual impulse, which she

gratified by masturbation. Gradually it came to pass that the sight of a good-looking man produced violent sexual excitement, and on these occasions, since she felt herself unable to answer for her own conduct, she used to lock herself up in her bedroom till the storm had passed away. Ultimately she surrendered herself to any available man in order to obtain rest from her torturing desires, but neither intercourse nor onanism gave her relief, so that she was finally sent to an asylum.

'As regards pathological increase of the sexual impulse, hyperæsthesia sexualis, the constitution of the individual is, according to von Krafft-Ebing, of great importance. He writes: "With a neuropathic constitution, a pathological increase of sexual desire is often associated, and such individuals bear for the greater part of their life the heavy burden of this constitutionally anomalous sexual impulse. The intensity of the sexual impulse may be such as to amount to an organic compulsion, and the freedom of the will may thus be seriously imperilled. Non-satisfaction of this desire may induce a true sexual heat (like that of lower animals), or a mental state characterized by sensations of anxiety, in which the individual yields to the impulse, and his responsibility for his action is most questionable. Should the person so affected not give way to his desire, he runs the danger, by this enforced abstinence, of injuring his nervous system by the induction of neurasthenia, or of seriously aggravating neurasthenia that already exists."

"Excessive sexual desire may arise either from peripheral or from central causes. The former variety is less common. Such cases as do occur, may arise from pruritus of the genitals, from eczema, or from substances which by their remote local action stimulate sexual desire, such, for instance, as cantharides.

"Sexual excitement of central origin is common in those suffering from congenital neuropathic predisposition, in hysterical subjects, and in states of mental exaltation. In such cases, when the cerebral cortex, including the psychosexual centre, is in a state of hyperæsthesia (abnormal excitability of the imagination, facilitated association of ideas), not only optical and tactile sensations, but also auditory and olfactory impressions, will arouse lascivious perceptions.

"Sexual hyperæsthesia may be continuous, with exacerbations, or intermittent, and even periodic. In the last case, according to von Krafft-Ebing, it is either an independent cerebral neurosis, or else a partial manifestation of a general condition of mental excitement."

In the poorer classes of society, an increase of the sexual impulse occurs in women chiefly in consequence of bad example and of unfavorable domestic conditions, such as lead to persons of opposite sexes sleeping in the same bed, and also in consequence of the abuse of alcohol. In the well-to-do classes, it is the perusal of modern equivocal romances, visits to theatres, balls, and evening parties, and, speaking generally, idleness combined with luxurious living, that serve to stimulate the sexual impulse in woman.

A certain dependence of the sexual impulse upon seasonal variations appears to exist also in the human species. At any rate in certain months of the year, a definite increase in the number of conceptions continues to recur, which indicates that during these months a larger number of sexually mature individuals is engaged in the discharge of sexual functions. Rosenstadt regards this as the manifestation of a "physiological custom," immanent in the physical constitution of civilized man, and inherited by him from his animal

ancestors. He explains it in the following terms: "Primitive man inherited from his mammalian forefathers the peculiarity of reproducing his kind only during a certain definite period, the period of heat or rut. After humanity had entered upon this period, copulation was effected *en masse*, as was easy in view of the primitive community of sexual intercourse before the origin of marriage. In the course of his progress toward civilization, however, man began to reproduce his kind indifferently throughout the entire year; but the original 'physiological custom,' in accordance with which reproduction occurred at definite seasons only, did not disappear, and persists, indeed, to a certain extent even to the present day as a survival of earlier mammalian life, and manifests itself in the annual recurrence in certain months of an increase in the number of conceptions. The analogy in structure and function between the genital organs of the human species and those of other mammals (the female anthropoid apes do not merely exhibit from time to time a period of heat, but are subject to a more or less regular menstruation), which for the most part reproduce their kind only at certain definite periods, leads to the conclusion that in the human species also the sexual impulse may originally have awakened only at a particular season of the year, and that the persistence of this physiological custom in man, in spite of the fact that sexual intercourse occurs all through the year, and notwithstanding that the conditions necessary to awaken the sexual impulse are actually perennial, must be ascribed to inheritance."

Sexual desire in women, the sexual impulse, outlasts the proper sexual life, and manifests itself even after the cessation of menstruation, when the possibility of conception has passed away; it appears, therefore, to

have no necessary connection with the function of ovulation.

This is indicated by the always respectable number of women who enter upon marriage even after the climacteric age. Thus the percentage of brides who were more than 45 years of age was: In Prussia, 2.58 per cent.; in England, 1.38 per cent.; in Sweden, 1.53 per cent.; in Ireland, 0.31 per cent. Of quite peculiar interest are the figures relating to elderly women who marry men considerably younger than themselves. Thus we learn from the tables of Routh that in the space of 10 years in Ireland:

Women between the ages of 46 and 55 years married	
Men below the age of 17 in.....	1 instance.
Men between the ages of 17 and 25 in.....	35 instances.
Men between the ages of 26 and 35 in.....	145 instances.
Men between the ages of 36 and 45 in.....	227 instances.
And women of ages greater than 55 years married	
Men below the age of 17 in.....	1 instance.
Men between the ages of 17 and 25 in.....	3 instances.
Men between the ages of 26 and 35 in.....	12 instances.
Men between the ages of 36 and 45 in.....	15 instances.
Men between the ages of 46 and 55 in.....	52 instances.

In England during the year 1855 the age of the bride exceeded the climacteric age in 778 instances. The brides were:

From 46 to 50 years of age in.....	135 instances.
From 51 to 55 years of age in.....	219 instances.
From 56 to 60 years of age in.....	89 instances.
From 61 to 65 years of age in.....	22 instances.
From 66 to 70 years of age in.....	7 instances.
From 71 to 75 years of age in.....	3 instances.
From 76 to 80 years of age in.....	3 instances.

In Bohemia in the year 1872 the oldest bride numbered no less than—86 years.

Börner reports cases in which the sexual impulse re-

mained in full activity after the change of life, and in some cases was greatly increased in intensity—these latter individuals being in a condition of real torment, which induced them to masturbate to obtain relief.

II

THE SEXUAL EPOCH OF THE MENACME

By the term *menacme* I designate the culmination of the sexual development of woman, during which the processes of reproduction, copulation, conception, pregnancy, parturition, and lactation occur.

The processes of puberty in woman are fully completed at the age of from eighteen to twenty years, so that from this time forward she is fully equipped for the performance of her sexual duties. The first act in the fulfilment of these duties is copulation, which in civilized countries is in the great majority of women first undertaken at the commencement of married life. The average age at marriage in the women in Central Europe is 22; but marriages at an earlier age are very common, and in many circles of society the average is as low as 20. The fullest maturity of sexual activity in women occurs, however, in the thirty-second year of life, this being the year in which on the average the maximum fertility is attained.

At the menacme, the beauty and energy of woman attain their fullest evolution, her sexual characteristics their strongest development. It is this period of life, however, that entails the greatest dangers to beauty and health in connection with the functions of the genital organs. Copulation, the first act of sexual intercourse with the male, often produces in the female injuries from which she never completely recovers. Gonorrhœal infection has been a source of unspeakable mis-

eries to women. Motherhood itself entails the risk of a great number and variety of illnesses, which, as puerperal sequelæ, affect this phase of woman's life. The struggle for existence, in which woman at her prime is also involved, and the fulfilment of duties to husband and children, further lead to the production of a series of changes, both physical and mental, in the feminine organism, which influence all the functions.

The great characteristic of this epoch is maternity. In maternity the fully developed woman lives and has her being, but to maternity also she often succumbs as a sacrifice to the fulfilment of her natural functions. Inasmuch as in this sexual phase the functions of the genital organs are of greater importance, to the same degree is enhanced the importance of the mutual relations between these organs and the other organs of the female body.

Another influence of fundamental importance in the sexually mature woman is that of the sexual impulse, the force of which is at times overwhelming, so that its gratification is sometimes sought without regard for the consequences to married and family life.

The physiology and pathology of the menacme coincides with the normal processes and pathological changes respectively of the female genital organs consequent on their functional activity as organs of sexual sensation and of reproduction. Woman as wife and mother stands at the climax of her existence.

In a quite astonishing manner, however, many of the advocates of the modern movement for the emancipation of women contest the significance of maternity to women.

A modern authoress and supporter of women's rights, Ellen Key, avows that she was in error when at an earlier date she "regarded maternity as the cen-

tral point in woman's existence." She asserts that it lies within the sphere of a woman's individual rights, as of a man's, to reject marriage, or to accept marriage while rejecting maternity. "The grounds for the rejection of maternity may as well be deeply altruistic as deeply egoistic. It lies within the sphere of individual rights to dispense with love or with maternity when either is regarded or both are regarded from this point of view. It is entirely within a woman's rights to transform herself into a member of the 'third sex,' the sex of the worker bee, of the neuter ant, if she finds therein her greatest pleasure. * * * Women exist in whom erotic feeling is totally atrophied; there are yet others who fail to find in intercourse with the modern man that soulful and deep erotic harmony which they rightly desire; and there are others still more numerous who desire love, but not maternity, which indeed they dread."

A celebrated German authoress of the present day, Gabriele Reuter, refers in similar terms to the justifiable fear with which so many aspiring and hard-working women regard maternity, "the perpetual, watchful, emotional dread of motherhood, a dread which causes them to turn at bay. A dread, a hatred, it is, which has grown so strong, so active, that one might almost regard it as an obscure perverse instinct, awakened and developed and strengthened by bitter necessity. It is as if in the innermost recesses of their nature such women had a belief that should they pay their tribute to sex they would lose all the energy, clearness, and brightness of mind, by means of which they have raised themselves above the level of their sex. And perhaps women of a certain type are justified in this fear."

Fortunately, however, the woman who does not prize

maternity still remains an exception. The great instinct for the preservation of the species, which nature has planted deeply in every human being, still, as a rule, in women remains much more powerful than the instinct of self-preservation at every one else's expense—more powerful than such self-sufficient egoism. And now as ever it is the duty of humanity to educate women for maternity from her youth upward, so that she is in every way fitted for the supreme duty of her sexual nature, the renewal of life from generation to generation.

Against the significance and importance of maternity to woman, the mountainous waves of the movement for the emancipation of women dash themselves as vainly as against the solid rock. Much justification may be found for the efforts of women in modern civilized communities to engage in departments of activity to which hitherto men only have been admitted; and as regards the intellectual capacity of women we may acknowledge their competence for the higher scientific professions; but while admitting this we must hold firmly to the physiological standpoint and must more especially bear in mind the sexual life of woman. Such professions only are suitable for a woman as do not entail a restriction of the sphere of her reproductive activity, a hindrance to her principal duty, that of maternity, an interference with the discharge of her obligations to husband and children, or a diminution of her domestic value and an evasion of her responsibilities in family life. As L. von Stein so justly remarks, the woman who spends the whole day at a desk, in the law courts, or in a house of assembly, may be a most honorable and most useful individual, but she is no longer a woman, she cannot be a wife, she cannot be a mother. In the condition of our society, the emuncia-

tion of woman is in its very nature the negation of marriage.

We may not agree with the great misogynist, Schopenhauer, in his depreciation of the female sex, or in his assertion that woman exists simply and solely for the propagation of the species, and that "her life should therefore flow more quietly, more inconspicuously, and more gently than that of man toward its goal;" nor need we regard as justified the severe sentence of the philosopher, E. von Hartmann, that from the moral standpoint, "the greater number of women pass the whole of their lives in a state of minority, and, therefore, to the end stand in need of supervision and guidance"; but the statement made by Friedr. Nietzsche in his book *Also sprach Zarathustra* deserves acceptance, "Everything in woman is a riddle, and everything in woman has its answer: it is called pregnancy," and again, "For woman, man is only the means; the end is always the child."

Unsearchable in its judgments, nature has imposed on woman alone the consequences of the act of generation; man has the pleasure, but not the labor and the pain. We might indeed regard as highly unjust the distribution of the rôles in the process of reproduction, were it not that in a mother's love and a mother's joys, woman finds a compensatory solace. The man's part is a much easier one and costs far less than that of woman; with the gratification of his sexual desire, man shakes off any further responsibility, whereas the woman's body becomes the workshop in the wonderful act of creation of a new human life.

"Maternity," says Lombroso, "is the characteristic function of the female sex, upon which rests her whole organic and physical variability, and this function is indeed throughout of an altruistic nature. Although

there is a certain antagonism between the sexual impulse and maternity—according to Icard, the sexual impulse is extinguished in women during pregnancy,—still, maternity appears to depend upon sexual perceptions. For instance, the act of suckling the infant often arouses voluptuous sensations, and Icard mentions a case in which a woman permitted fertilization to occur solely on account of the pleasure obtained by suckling. The anatomical cause of this fact is to be found in the connections between the nipple and the uterus by way of the sympathetic nervous system. * * * It is likewise probable that in the happy feeling of maternity there intermingle very gentle voluptuous sensations derived from the genital organs." According to Bain, also, very delicate sensations of contact form an element in maternal love.

The epoch of the menacme is that in which, independently of maternity, the sexual impulse often becomes so powerful in woman as to be entirely dominant. The problems relating to marriage and to the sexual position of woman, so widely discussed at the present day, are, therefore, of especial importance in regard to women at this period of life. The forcible repression and control of the sexual impulse inculcated by moral and religious ordinances are now, according to the modern leaders, both male and female, of the woman's movement, to be abandoned; and it is loudly asserted that every woman has the same right as man to physical love and the happiness it produces. Hence, free love is demanded. "Freedom in love, freedom for love—this is what the dignity of the human race demands," asserts the authoress of a book recently published (Elisabeta von Steinborn, *The Sexual Position of Woman*). With laws for the regulation of marriage, this section of the women's rights party will have

nothing to do. A truly good and honorable man, they contend, has as little need of laws to regulate his amorous relations as he has of laws against murder and theft. In the first place, love, the sexual relation between man and woman, must be free, and humanity, freed from vexations and needless control, will then seek and find the proper path, even if at the expense of a few errors by the way. Only after this unrestrained sexual intercourse has lasted for a long time, will free marriage become the rule. "Out of this phase will develop the monogamic system willed by God, for which, in its most ideal form, we are not yet sufficiently ripe." It is hardly necessary to discuss in detail the general deleterious influence of such unlimited, unregulated free love upon the community, upon human society as a whole, to describe the results of free love, to attempt to realize the chaos which it would bring about in the social relations of civilized humanity. We must rather indicate it as desirable from the medical standpoint, also, that such a change in general domestic economy shall be aimed at as will enable the great majority of women to share in married life and family happiness, and thus making allowance both for human nature and the demands of social life, to effect a true harmony between sexual morality and sexual practice.

We must point out that in so far as the modern woman's movement aims at dispensing with man and at basing the entire life of woman upon the independent ego, that movement is in opposition to nature and its eternal laws. A woman who thus seeks the solution of the woman's question in the direction of freedom and independence is one who endeavors to avoid the burden of womanhood. She desires to escape, always from guardianship, often from maternity, and usually from the restrictions, the unselfishness of womanhood. But

none the less does she remain unable to escape from her femininity.

"The true significance of woman," insists Laura Marholm in opposition to the modern tendency, "has at all times consisted rather in what she is than in what she performs, and it is precisely in the former point that the women of the present day seem so unusually wanting. Their performances are indeed many and various, they study and they write innumerable books, they are the directors or principals of all possible concerns and collect funds for every possible object, they wear doctors' gowns, conduct agitations, and found clubs, and they come continually more and more into publicity. And yet their public significance is after all diminished. The greater the influence of woman in the mass and as a numerical majority, the less is her influence as an individual, the smaller is the triumph of her sex. She herself has induced man to sound the trumpet note of the abhorrence of women. Tolstoi in *The Kreutzer Sonata*, Strindberg in numerous dramas, Huysmans in *En Ménage*, write in this strain; and in the works of many lesser luminaries we encounter this mistrust of love. * * * The modern system of education for girls, with its polyglossia and polymathy, favors a superficial development of the understanding, and produces women who are pretentious without being profound."

Feminine beauty suffers during the menacme from the stress of the demands made on the sexual activity as well as on the functional capacity of the individual. Repeated, rapidly succeeding pregnancies and confinements impair the beauty of the breasts and the abdomen, the figure and the carriage. In consequence of suckling, the breasts, hitherto firm and elastic, usually become more or less pendent and wrinkled, sometimes

also flabby and inelastic, sometimes nodular. Diseases of the genital organs and the disorders of the general health dependent thereon, leave disfiguring wrinkles in the face and other traces in the whole structure of the body. Toil, anxiety, and grief also write their horrible marks deeply on the appearance. The mature working-class woman, through sharing in masculine labors, through long-continued muscular exertion, and through neglect of bodily care, frequently assumes in her features, her carriage, her figure, and her whole appearance, a rather masculine type.

The beauty and the youthful freshness of girls belonging to the laboring classes seldom endure for long after the menarche, and in cases in which the environment is one of poverty, they last through a very short part only of the epoch of the menacme. The early appearance of wrinkles in the face, the stiff, angular character of the movements, the ungraceful carriage of the body, all these combine to make a woman of five-and-twenty who groans under the burthen of toil appear at the first glance an elderly woman, and a closer investigation shows what damage has been wrought to the attributes of beauty, how the breasts are flabby and flattened, the belly prominent, the buttocks pendulous, the arms muscular.

In the well-to-do classes, again, at this period of life, when generous diet combines with insufficient exercise, an abundant deposit of adipose tissue may already have occurred, resulting in a great impairment of beauty, the body and limbs being enlarged, the gait and the carriage correspondingly altered for the worse—changes which seem desirable only to those orientals to whom such obesity, such exaggeration of femininity, is sexually stimulating. If, however, this deposit of fat is not excessive, this it is which endows women during

these years of fullest development with an imposing appearance and buxom form. In favorable circumstances, beauty of this type may persist to the fortieth year of life and even beyond, and it is of such a character as to justify the proverb that woman's first sexual epoch is dedicated to love, her second to voluptuousness.

"Bountiful nature," writes Mantegazza, regarding woman at this sexual epoch, "sends to woman an ingenious engineer, who enlarges the hills to mountains and fills up the valleys with a soft alluvium of fat. The commencing wrinkles disappear, being smoothed out under the beneficial influence of this plastic material; the slender, elastic palm-tree stems are converted into majestic columns of Parian marble; quality is replaced by quantity, and if the eye has lost a few provinces, the hand has gained just as many. * * * A certain number of chosen women understand how to preserve for as long as ten years the unstable equilibrium of the period which separates these two ages of life. These are divine beings who with every oscillation of their tresses or rocking of their hips, with every undulation of their bosom, every serpentine movement of their limbs, instil desire. * * * They constitute our most intense delight, and our intensest torment, they make our life a blessing or a curse, they are the uttermost goal of human passion, of human voluptuous desire."

Among the injuries to beauty effected by pregnancy, one above all evident to the eye is the almost invariably ensuing change in the skin, principally taking the form of a change in pigmentation, with the appearance of spots varying in size and tint, on the face and especially on the lips and forehead; there is greatly increased pigmentation also of the areola mammae and the linea

alba, and in addition of the labia majora and minora and of the anal region. It is not certain whether this chloasma uterinum is dependent, as Jeamin assumes, on the discontinuance of menstruation, or, as Virchow believes, on changes in the blood and the blood-pressure. Sometimes, also, in pregnant women, we observe on the face, chiefly on the nose and the cheeks, dilatations of the small cutaneous vessels, often associated with acne nodules.

Transiently during pregnancy, but in some cases permanently also, the beauty of the lower extremities is apt to be impaired by enlargements of the veins, the formation of varices, and sometimes also by œdema; these conditions depend upon the hindrance to the venous return caused by the pressure of the pregnant uterus. Thick, vermicular, bluish strings or nodular enlargements appear in the course of the great veins, with consequent eczema and ulceration. In pregnant woman, eczema is common in other regions, on the face, the hands, the forearms, and the genitals; also erythema, urticaria, and the pustular eruption known as impetigo herpetiformis.

Parturition and lactation entail further disfigurement of the skin through the production of various lesions, such as cracks and fissures of the skin of the breast, dermatitis due to venous thrombosis in the lower extremities, scarring of the breast after mastitis, etc.

HYGIENE DURING THE MENACME

During the sexual epoch of the menacme a woman's principal hygienic need is marriage completely satisfactory alike to body and to mind. It cannot be denied that sufficient sexual gratification, regular, of course, and free from all excess, such as is usually experienced in married life, is very advantageous to the

health of a woman who has attained sexual maturity—even though we admit that the drawbacks of sexual abstinence, regarded as a cause of disease of the female genital organs and the nervous system have been, as a rule, greatly exaggerated.

The inability to marry always makes a deep impression on the mental life of woman, and in many cases also gives rise to burning desire and tormenting yearning of an erotic nature. The unmarried miss life's true goal and fail to enjoy the natural exercise of their functional capacities; alike in the cultured lady and in the poor working woman who has failed to marry, the thoughts and feelings return again and again to her own condition in a self-tormenting manner.

The physical and mental disadvantages entailed by sexual gratification when obtained by an unmarried woman, one who, according to modern phraseology, "wishes to secure her natural share of the joys of love," and who regards voluntary chastity as "a sacrifice to meaningless prejudices"—need not be more particularly described.

Free love, moreover, is the most important disseminator of gonorrhœal infection. "In any future commonwealth," says Runge, "in which marriage is abandoned in favor of the general practice of free love, the human race will be overwhelmed by gonococci in a manner now hardly conceivable, and the reproductive capacity in both sexes will be diminished by the results of gonorrhœa to a very serious extent."

Frequently enough, also, free love leads to prostitution, which at the present day is so widely prevalent. Various reasons have been suggested to account for the increase of prostitution. Among these are: The growth of modern industry, with the consequent aggregation of the population in large towns; the decline in

the marriage rate; the postponement of marriage; universal military service; the freer mutual companionship of the sexes; and many others. At any rate, the fact would appear to be established, that in the case of woman the determining cause of prostitution is hunger rather than the sexual impulse. The worst paid classes of workwomen are shown by official statistics to furnish the largest number of recruits to the ranks of prostitutes; and it is during times of deficient employment that the number of women practicing occasional prostitution increases. Thus, material need is the most important of the causes of prostitution.

This remains true even though the doctrine of Lombroso and Tarnowsky should find fuller justification, the doctrine that the practice of prostitution by women is the natural expression of a congenital morbid predisposition, "which impels them, in defiance of their direct advantage, of reason, and of all counter-advice, to adopt this accursed mode of life." Prostitution, in this view, is to be regarded as the inevitable outcome of congenital moral insanity. This is certainly true of a small proportion of prostitutes; but is as certainly false of the great majority, in whom unfavorable, difficult conditions of life form the determining cause. A certain inherited or acquired mental disposition may, indeed, be assumed to exist in these cases also—an unstable moral equilibrium, an insufficient development of the force of the will and of the power of resistance.

The hygienic requirement of married life for woman during the menacme is undoubtedly sometimes hard to fulfil in our day, when the more elaborate and expensive standard of life has increased the difficulty of supporting a family; but from the medical point of view it is necessary to insist forcibly on this categorical imperative, in opposition to the view advanced by

the modern women's rights' party, that "love is moral also in the absence of legal marriage" (Ellen Key); in opposition to the yet more extreme opinion of George Sand and of Almquist, who, regardless of consequences, declare marriage to be immoral; and, finally, in opposition to the advocates of "free love," who wish woman to be as free as man in sexual relations.

Much as we may wish that man and wife should be in complete harmony in marriage, and that they should feel themselves to be firmly united alike by mutual love and by a reciprocal sense of duty, none the less we must consider the modern maiden ripe for marriage as unjustified in demanding, before undertaking marriage, "perfect love as typifying the inner yearning of two beings to become one;" and we must regard the latter-day woman as extravagant in insisting that the man shall enter upon marriage in a condition as virgin as that of his contemplated wife. "Perfect love" is as rare and as little to be expected as perfect beauty; and the sexual life of man differs entirely in nature and in the course of its development from the sexual activity of woman.

Doubtless they spring deep from the soul of woman, the demands expressed by the writer of the book *Vera*, and by her numerous imitators, the apostles of "Veraism,"—the demands of the maiden entering upon marriage that her husband shall be as chaste and sexually as unspotted as herself. Difficult of fulfilment as they are, if fulfilment is even possible, these demands must none the less be regarded as characteristic of the sexual life of modern womanhood. "Is man's sexual honor," exclaims Vera, "then altogether different from that of woman? Is not the alleged necessity for sexual gratification in youth either a well-organized fraud or an enormous error on the part of physicians? Is

it possible that chastity can entail diseases as terrible, as destructive to life and happiness as those that result from unchastity? And is it not a crying sin, even if some of these fears are justified, to ruin both mentally and physically the whole race of women? * * * Man demands from the girl of his choice, not chastity alone, but an absolutely unblemished character. And rightly so. But the wife must share her husband with street-walkers? She must bear the pangs of maternity, while fortified by the terrible knowledge that the father of her children has wasted his youthful virility in purchased embraces, that he has not recoiled from impurity, that he has exposed himself to the risk of infection with the most horrible diseases, that he has squandered his virginity in the most bestial sensuality? * * * We girls must also be granted the right to demand from the man of our choice the same purity, the same unspottedness by sensuality, that he so rigorously demands from ourselves! We must no longer content ourselves with the remnants that are left for us by others! We must no longer be satisfied with man's moral inferiority! Then there will be more happiness, more love, more health and joy of life!"

These accusations and demands so boldly made are not to be disposed of by mere mockery. With deep sorrow we must admit the absolute truth of the charge that too many men clamber out of the abyss of debauchery to a blighted marriage. But the demand for equal moral rights, for the abandonment of the hitherto prevalent bisexual ethical standards, is in vain conflict with actuality, with the defensive instincts of young men, with the difficulties entailed by the struggle for existence, with the increasing pretensions (to sexual freedom) of women themselves; but above all is it in conflict with the thousand-year-old notions of sexual honor

in the male and the female respectively, and with the undeniable fact that the mature man is capable of elevating himself out of the base intoxication of the senses characteristic of youth, to attain the noblest and most intimate married love, whereas the girl who has once descended into such an abyss sinks therein and is beyond the possibility of rescue. Thus early marriage with equal purity of husband and wife remains a postulate which the present can hardly be expected to satisfy, and one whose fulfilment must be left to the future.

In consequence of modern writings and discussions concerning the erotic problem, there has arisen a hypersensibility on the part of women in respect of the conditions in which they pass their married life, leading them to demand greater independence, a greater expansion of their own individuality; this tendency must, however, be resisted, if the marriage is to be a happy one, with mutual comfort and reciprocal consideration, one suitable, not for exceptional beings in an ideal state, but for men and women as they really are. In such a marriage, affection and a sense of duty will strengthen love and preserve fidelity. A prudent, clever woman will always understand how, notwithstanding all necessary self-surrender, to preserve the freedom of her own individuality and the esteem of her husband.

Marriages based upon true inclination usually result in the birth of stronger and more beautiful children than marriages in which the money-bags were the sole or the principal determining cause. In England, where people commonly marry when still quite young, beautiful and healthy children are more often seen than in France, where marriages of expediency form the great majority. According to Bertillon, of 1,000 young

men from 20 to 25 years of age, in England 120 marry, but in France less than half that number, viz., 57 only. And 100 wives between the ages of 15 and 40 give birth annually, in England to 39 children, in France to 26 only, a number less by one-third.

In deciding upon marriage, hereditary influences deserve careful consideration in respect alike of the family of the prospective husband and that of the prospective wife. For it is well established that the law of inheritance relates not only to the peculiarities of external configuration, to the features, the stature, the tint of the skin, but also that children inherit from their parents their mode of bodily development, the functional activity of their organs, the duration of their life, their predisposition to disease, and even their intellectual and moral qualities. As regards hereditary predisposition to disease, the most important are, as is well known, the predisposition to tuberculosis, that to malignant tumors, and that to mental disorders.

Great disparity in the respective ages of prospective husband and wife entail various kinds of unsuitability for marriage. An elderly man who marries a young girl, even if he still possesses a certain amount of virility, is unlikely to procreate healthy and powerful children; and these latter for the most part will be weakly, scrofulous, cachectic, endowed with deficient powers of resistance, and often badly equipped from the intellectual standpoint. Similar considerations prevail in respect of marriages in which the husband has been exhausted by earlier sexual excesses, so that he retains no more than remnants of virility, whilst his semen is of doubtful fertilizing power.

Plato maintains that before every marriage the man and the woman should both undergo official examination to determine their fitness or unfitness for the mar-

ried state, the man being absolutely nude, and the woman stripped to the waist, for the examination. This author goes so far as to regard it as "a form of homicide for a man to embrace a woman when he is incapable of fertilizing her." How rarely it happens in our day, however, that the physician, the official with the requisite knowledge to fulfil Plato's requirements, is asked for his opinion regarding the desirability of a contemplated marriage! The only occasion on which this is likely to occur is when a man intending to marry wishes to be assured that he is completely cured from an earlier infection with syphilis, and, therefore, runs no risk of transmitting the disease to his wife or to possible offspring. But it never occurs to the parents of a girl about to marry to ask the physician whether she is physically suitable for marriage.

In deciding on marriage, however, care should before all be taken to determine that the girl has attained complete physical and especially complete sexual development. The age at which woman attains complete sexual maturity is in our climate and race coincident on the average with the twentieth year of life.

For the hygiene of marriage it is necessary that the bride should not be extremely youthful. Notwithstanding the fact that the legal codes of civilized countries nowhere demand for girls a greater age than fifteen years before permitting marriage, this limit is, generally speaking, fixed far too low. Before becoming a wife, the girl should not merely have attained complete physical development, with her reproductive organs in a state of maturity, but she must also be developed intellectually to such an extent that she is fully capable of understanding the nature and significance of marriage. At the age at which marriage is legally permissible, a girl is still far from having attained physical

and mental ripeness for marriage, reproduction, and maternity.

Especially with reference to the last consideration is it inadvisable that in our climates a girl should marry earlier than from 18 to 20 years of age, and preferably even she should first attain the age of from 20 to 22. In that case her happiness as a mother will be more secure, and there will be a greater probability of her producing a healthy progeny. In the East, indeed, quite different views prevail. According to the laws of Manus, a girl might marry on attaining the age of eight years; if within three years thereafter her father failed to provide her with a husband, she might choose one for herself. Among the Hindus it is regarded as a disgrace to the parents if a girl does not marry quite young, indeed before the first appearance of menstruation. Atri and Kasypa state that if a girl begins to menstruate before she leaves her father's house, the latter must be punished as if he had destroyed a foetus, while the daughter herself loses caste. Marriage delayed till after the appearance of menstruation being regarded as sinful, girls are married while still children, in order to prevent the loss of mature ova, which is regarded as equivalent to infanticide. Very early marriage has thus in India been legally ordained for thousands of years. The Hindus, who even now regard every menstruation which has not been preceded by coitus in the light of infanticide, marry their daughters before the age of puberty.

According to oriental tradition, Mahomet married Khadijah when five years of age, and cohabited with her three years later. In the Bible, numerous similar examples are recorded. Among many savage tribes, as, for instance, among some of the aborigines of India, and among the indigens of Australia, copulation is usu-

ally effected before girls reach the age of puberty; in India, indeed, according to Ploss and Bartels (*Das Weib in der Natur und Völkerkunde*), marriage with immature girls is a widely diffused custom, and in Australia a child of ten or eleven is often found to be the wife of a man of fifty or the concubine of a sailor. In general, according to these authors, we find that the age of nubility in girls is lower in proportion to the lowness of the stage of civilization attained by the race or people to which they belong. Among the ancient Romans, girls were commonly married between the ages of thirteen and sixteen years.

In the Talmud, Rabbi Joshua gives the following advice regarding early marriage in Jewish girls: "If your daughter has attained puberty and is twelve years and six months old, she must be married at any cost. If no other means are available, manumit one of your slaves, and give her to the freedman to wife."

Experience proves, however, that in our climate, at any rate, girls who marry at a very early age are inferior in fertility to those who refrain from marriage until the genital organs have attained complete maturity; and statistics show that those women who marry before attaining the age of twenty must wait longer for their first pregnancy than those who marry between the ages of twenty and twenty-four. At the higher age also, women bear parturition and its consequences more easily than those who marry very young. A similar influence in marriage to that resulting from undue juvenility is exercised by its opposite, marriage when a woman is already elderly; in this case fertility is limited, and health also is especially apt to suffer. When the indications of the climacteric are clearly apparent, marriage is contra-indicated, not only on account of the impossibility of fertilization, but also in respect of its

general unsuitability in the closing stage of the sexual life.

Not only is the absolute age of the woman of importance in deciding on the advisability of marriage, but the relative ages of the proposed husband and wife must also be taken into account, first of all in respect of the wife's possible fertility, and secondly in respect of her general health. The most suitable arrangement is that in which there is no marked difference in age. The husband may be, and indeed in existing social circumstances almost necessarily is, somewhat older than his wife, as much perhaps as eight or ten years. But a very great disparity of age (in either direction) is a serious error. If a very young girl marries an elderly man, or a developed matron marries a young man, the true purpose of marriage is unfulfilled, the eternal laws of nature and all ethical principles are infringed. In the breeding of animals, the fundamental principle has long prevailed that the animals chosen for coupling should be well suited each to the other and should be in perfect physical condition; and breeders are also familiar both with the favorable influence of good nourishment and with the advantage of the opportune crossing of distinct varieties. The same principles are equally applicable to the human race, neglected as they commonly are in practice.

With regard to the marriage of near kin, we can only remark that the marriage of those closely related by blood should, as far as possible, be avoided, and that such a marriage must be absolutely prohibited when in both families there is a history of tuberculosis, mental disorders, diabetes, and the like. When first cousins contemplate marriage, it is indispensable, not only that both individuals should be in perfect health, but also that on neither side there should be any serious

family history of transmissible disease or transmissible morbid tendency; and, further, it is absolutely necessary that no such marriage of near kin should have taken place in the proximate ancestry of the cousins, *i.e.*, their cousinship must not be a double one, derived both from the paternal side and the maternal. It is indeed to be recommended, with a view to the production of a healthy and powerful posterity, that marriage should bring about a crossing of healthy individuals proceeding from different families, different places, and different constitutional types. An instance of the advantage to be found in this practice is pointed out by Ribbing, who shows that the most powerful aristocracy in Europe, that of England, by the gradual creation of new peers, on the one hand, and by the gradual decline of younger sons and their descendants into the middle class, on the other, has undergone a continual crossing with less exalted but originally sounder stocks; in this way its vigor and fertility have been maintained, in contrast to the nobility of many continental states, which has so largely perished, in consequence of its exclusiveness in the matter of marriage.

"In this connection," continues Ribbing, "we must bear in mind, that blood-relationship is not the only matter that has to be considered; in the interest alike of the family, and of society, it is necessary to demand that certain degrees of relationship by marriage alone, should fall within the 'prohibited degrees' of love and marriage. There are certain groups related by marriage and held together by the bond of affection, from which foster-parents and guardians may most suitably be selected to fulfil the duties as regards education and training of children who have been orphaned in early years. For such a purpose none seem better adapted than the brothers and sisters of the deceased parents;

but the upbringing of the children can be confidently entrusted to the former only if the relationship between the older and the younger branches of the family is one regarded by law, and still more by morality and custom, as one precluding the possibility of the occurrence of sexual love and marriage."

Möbius, writing on *The Ennobling of the Human Race by Selection in Marriage*, observes: "The most important aim of natural development is the perfection of humanity. The qualities of the coming generation depend for the most part upon the qualities of the parents. Marriage from affection insures the fulfilment of nature's aims with more security than marriage from reason; since what we have to think of is not the happiness of the married pair but the quality of their children. Of great importance, also, to the development of the human race are the conditions during the commencement of life, and the mode of education. The improvement of the race has not hitherto been the conscious aim of the generality of people. The law does not as yet, as it should, take into account the advantage of posterity. Capital punishment is fully justified and purposive. Criminals should not be allowed to marry. The perpetuation of disease by inheritance should be checked by the utmost powers of the state. Any one marrying while suffering from any venereal disease still in an infective condition should be punished. The marriage of persons suffering from tuberculosis should be prohibited. For the prevention of disease is more important than its cure. The most important factor in preventive medicine is an improvement in the conditions of life. The human ideal should be, goodness of heart in association with physical and mental health. Goodness, beauty, and strength should be simultaneously pursued. Since, however, man is made by birth far

more than by education, selection in marriage is of fundamental importance. In the choice of a partner, attention is rightly paid to beauty, since beauty and health are fundamentally identical; moreover, a human being endowed with beauty is usually also more moral than one devoid of that attribute. Equality of birth is, as a rule, desirable in marriage; but not the family only is to be considered in determining the existence of such equality, individual characteristics must likewise be taken into account. Whether the crossing of races is desirable is not yet certainly determined."

From the hygienic standpoint it is necessary that in marriage also the frequency and the manner of sexual intercourse should be regulated.

Wise men and law-givers of all the nations of antiquity have insisted upon the necessity of certain intervals between the acts of intercourse. Thus, Mahomet prescribed 8 days, Zoroaster 9 days, Solon 10 days, Socrates also 10 days. Moses forbade intercourse during menstruation and for a week after the cessation of the flow. Luther prescribed intercourse "twice a week."

Birds and many mammals are competent to perform intercourse at exceedingly short intervals. A well-bred cock will repeat this act 50 times daily; a sparrow, 20 times in an hour; a bull, 3 to 4 times in an hour. In the human species, however, too rapid repetition of intercourse is deleterious not only to the male, but to the female also, though the latter certainly suffers in less degree. For in this act the female plays a more passive part, and for this reason can repeat it with impunity more frequently than the male, who loses semen at each repetition. It is not possible, however, to lay down precise rules as to the permissible frequency of

intercourse in either sex; the matter must depend upon physical needs. Moderate and regular indulgence in sexual intercourse is unquestionably advantageous to woman both physically and mentally, regulating all the functions of the body, and tending to produce a contented and cheerful frame of mind.

During menstruation, a woman should refrain from intercourse. By the Mosaic law the death punishment was allotted both to the man and to the woman who indulged in coitus while the latter was menstruating. As a matter of fact, considerations alike of hygienic cleanliness and of sanitary precaution prohibit the performance of coitus during this period. Severe menorrhagia, perimetritic irritation, and parametritic inflammations, have been observed to follow such indiscretions. On the other hand, it is more than doubtful whether, in the event of pregnancy resulting from intercourse performed during menstruation (and conception is especially apt to occur at this time), the child is likely, as earlier authors maintained, to be unfavorably affected, and to suffer from cachexia, scrofula or rickets.

After the act of intercourse, a woman should rest; and indeed sleep for some hours is especially to be recommended. A vaginal douche should not be administered until several hours have elapsed, otherwise there will be a risk of preventing fertilization of the ovum. The water employed for vaginal irrigation should never be quite cold; a temperature of 79° to 82° F. (26° to 28° C.) is best.

All measures for the purpose of artificially increasing sexual desire, such as alcoholic beverages (especially champagne), and certain drugs (especially cantharides), are even more harmful to women than they are to men. The woman who conceives while in a state of intoxication commits a great sin against the coming gen-

eration.¹ Just as harmful, however, are the anaphrodisiacs sometimes employed to diminish the intensity of sexual desire when this cannot be gratified. When affected with intense sexual excitement, a woman is much more unfavorably situated than a man, since man claims the right to indulge in sexual intercourse whenever he feels disposed, and has, moreover, ample opportunity for sexual gratification. A woman, however, properly endowed with self-respect, will understand how to bridle her senses. Bodily exercise, moderate, unstimulating diet, intellectual occupation with serious matters, the avoidance of equivocal literature and of sensual dramatic representations, cold bathing, and the use of a hard mattress and light bed-clothing—these means will coöperate powerfully toward the prevention of excessive sexual desire. Horace already remarked: "Otia si tolles, periere Cupidinis arcus."

The wife should know how to bridle, not her own desires only, but also those of her husband. She must not demand too much during the intoxication of youthful vigor; she must prevent the complete combustion of the flames of masculine passion, and must keep sparks glowing in the ashes. Economy during the sexual prime preserves sexual power, enables a man to continue intercourse to a ripe age, and avoids premature exhaustion and satiety. When the husband is drawing near the end of his sixth decade, the wife must accustom herself to see in him rather the father of her children

¹ The statement is so often made that conception occurring when one or both parents are intoxicated is likely to be harmful to the offspring, that it seems expedient to point out that neither the author of this work, nor any other author known to me, has ever brought forward any rigorous scientific evidence in proof of the alleged fact. It is one of those crude generalizations whose superficial verisimilitude leads to their continued though unsupported reassertion. The fact that the notion of procreation by inebriated progenitors is repugnant to our æsthetic sensibilities has, of course, nothing whatever to do with the logical proof of the assertion that such an act is harmful to the fruit of conception.—TR.

than her own husband, and must reduce her sexual demands to that measure which will not be injurious to his health. Demosthenes, writing of the sexual life of the Athenians of his time, said: "In order to obtain legitimate offspring and to provide a faithful guardian of our household, we marry a wife; for our service and for the performance of daily household duties, we keep concubines; for the joys of love, we seek the *hetairai*." The task is extremely difficult, but a clever and virtuous modern wife must endeavor to combine in her single personality the sensual attractiveness of an Aspasia, the chastity of a Lucrece, and the intellectual greatness of a Cornelia; she must bear in mind the epigram of Bacon, "A wife must be a young man's mistress, a middle-aged man's companion, an old man's nurse."

In the act of intercourse the woman must always play the more passive part; she must be desired, rather than desire. Woman's modesty increases man's desire. By this coquetry, permissible because natural, the woman can bind the man to herself, and can give the lie to the assertion that marriage is the grave of love. Partial concealment of her desire on the part of the woman is more stimulating to the man than an open manifestation of the sexual impulse; and a certain amount of modest reluctance is more alluring to him than a plain invitation. Plenty of room must be left for the play of fancy and imagination. Schiller makes Fiesco say to the Countess Julia, as he covers up her bosom, "The senses must be blind letter-carriers only, and must not be aware of that which nature and the imagination communicate each to the other. The best of news is stale as soon as it has become the talk of the town."

For this reason, also, it is more suitable that intercourse should take place, not by day, consequent on the

brutal prompting of vision, but by night only, beneath the protecting veil of darkness. A night's rest, moreover, will serve to restore the exhausted nerves, and to replace the expended secretions. Less advisable is coitus in the morning, on awaking from sleep, since the labors of the day must immediately thereafter be undertaken. Partially impotent men only, who wake up with an erected penis, endeavor to avail themselves without delay of this favorable opportunity, bearing in mind the French proverb, "On aime quand on peut, et non pas quand on veut."

The French custom, in accordance with which the married pair sleep together in a double-bed is undesirable on several hygienic grounds, and, in the first place, for the reason that this continuous nocturnal proximity is likely to give rise to the habit of indulging in excessively frequent acts of intercourse. The best and most affectionate of men has neither disposition nor capacity to play the part of Romeo every night, and thus the value and enjoyment of marital duties becomes lessened. The fulfilment of his desires should not be rendered quite so easy to the husband; he should always appear the lover, one who seeks a woman's favors because he longs for her; he should not be the master, exacting an unquestioned right. For this reason, separate beds are advisable for the married pair, and, when possible, even separate bedrooms.

Among the ancients, Lycurgus, the Spartan law-giver, regarded maternity as woman's principal attribute, and considered the sexual impulse to be the means merely by which healthy citizens were provided for the state. In accordance with this view, the sanctity of marriage was violated, and every powerful, handsome, and valiant Spartan had the right to request the privilege of intercourse with the wife of another, in order

to enrich that other's family with his seed. Elderly, impotent men conducted well-formed young men into the arms of their own wives. The girls, like the young men, went through a course of gymnastic exercises, in order to harden their bodies, and to fit them for the bearing of strong and healthy children. No man might marry before attaining the age of thirty, no woman before attaining the age of twenty. Girls ripe for marriage were assembled in a dark place, and there the young men chose their brides, as chance might direct. The young men were allowed to visit their wives by night only, and secretly, in order that the vigor of the sexual impulse might be increased and maintained.

Among the Spartans, it happened quite frequently, that a man whose wife had remained childless, and who believed himself to be at fault in the matter, would beg one of his fellow-countrymen, or even a foreigner, to come to his assistance. It was enacted by one of Solon's laws, to prevent a man from neglecting his marital duties, that he should have intercourse with his wife not less than three times monthly. According to another of Solon's laws, an Athenian heiress might call upon her nearest relative for the gratification of her sexual desires.

The bluntest contrast to this Spartan simplicity is furnished by the unbridled lasciviousness that prevailed in Rome under the Cæsars, when women's sole desire was sexual enjoyment, while maternity was a state to be avoided. To such an extreme was this carried, that the Roman ladies of that day preferred to marry eunuchs, and further, as Pliny reports, hermaphrodites were in great request. Juvenal writes: "There are women who prize the infertile embraces of base eunuchs; thus they are able to dispense with the use of abortifacients."

The hygiene of the nuptial night deserves from the physician more attention than it has hitherto generally received. He should warn and enlighten the young husband, in order that the brutality with which the act of defloration is apt to be performed may be lessened, and further in order that mistakes in this connection, resulting from ignorance and likely to have serious consequences, may be avoided. It is well known that lacerations of the hymen and its environment, and even serious injuries of the genital organs, may result from maladroit attempts at penetration. The physician will admonish the husband in the words of Michelet: "Bear in mind in this hour that thou art an enemy, a tender, considerate, and gentle enemy!"

The young woman entering upon marriage should receive instruction from her mother regarding all the sexual processes of copulation, instruction at once earnest and complete. By such enlightenment, the young bride will be spared much suffering, and a sudden disillusionment which might seriously affect the whole of her future life will be avoided; complete ignorance, on the other hand, may lead, not merely to needless mental and physical suffering, but to the most tragic consequences on the bridal night. In one case known to me, the young wife, who before marriage was utterly ignorant of the nature of physical love, was so completely overwhelmed in her ideals by the somewhat energetic procedure of the bridegroom as soon as he found himself alone with his wife, that she fled from her home then and there in the night, and by no persuasions could be induced to return.

In that decisive moment in which the maiden loses her virginity, she must find in her husband, not the brutal man who forcibly takes possession of her body,

but the chosen man of all, to whom her love can refuse nothing.

"Delicate foresight and restraint," writes Ribbing, "are needful above all at the commencement of married life. The young wife, coming to the bridal bed a pure virgin, is not, like her husband, fully prepared for what is to take place. In all cases she is somewhat fearful of the new experience. The first act of intercourse involves for her a certain amount of pain, and this pain is not solely physical. * * * Moreover, we must remember that the entire change in her mode of life makes a deep impression upon a woman's mind; time and quiet are needed before she can find herself at home in the novel surroundings, before she can adapt to the changed circumstances her moral and religious convictions, and before she can 'think true love acted simple modesty' (*Romeo and Juliet*, III, 2.16). Impatient husbands, through want of knowledge and lack of consideration during the honeymoon, have often ruined the happiness of subsequent married life."

It happens often, unfortunately, that the wife has reason to complain of the reckless manner in which her husband has used, or misused, his sexual powers. Frequently enough, on the bridal night, the man proceeds with such violence in his assault on the virgin reproductive organs of his newly-wedded wife, that we must actually speak of him as ravishing an ignorant and timid girl. Later, when the stimulus of novelty has passed away, the husband often performs intercourse in a manner more calculated to awaken his wife's sexual desires, but in seeking his own lordly gratification and obtaining it he is still apt to leave out of the reckoning the need for effecting coitus in such a way as will give complete satisfaction also to his wife.

The wedding journey likewise deserves considera-

tion from the hygienic standpoint. Much is to be said in favor of such a journey, inasmuch as it endows the necessarily somewhat brutal first act of intercourse with an aspect of romance. The removal to a foreign country, to a strange environment, will spare the chaste maiden much shame and vexation. On the journey, moreover, the young couple are much in each other's company, and the process of mutual adaptation is agreeably favored. And yet this modern custom of making a wedding journey entails certain serious disadvantages.

The young woman leaves her home and her nearest relatives, and is in a moment involved in the excitement of travel, an excitement liable to increase to the degree of morbid anxiety. The fatigues of railway-travel, of wandering about strange towns, of visits to museums and picture-galleries, are apt to cause general loss of nervous tone, and also local hyperæmia of the genital organs. In addition, false modesty and the prescribed arrangements for the journey may lead the onset of menstruation to be ignored and the customary rest at this period to be dispensed with. Still more, the possibility of the occurrence of conception and of the commencement of pregnancy is usually left altogether out of the account. Many an attack of menorrhagia, of perimetritis, and of endometritis, many a miscarriage, and many instances of protracted sterility, are dependent upon the hygienic mistakes of the wedding journey, and less, indeed, upon the abuses arising out of the intoxication of passion, than upon the fatigues of excessive travel both by day and by night. The bride who on her wedding-day was young, healthy, and full of vitality, not infrequently returns from the wedding journey a sickly and debilitated woman.

With regard to wedding journeys in relation to the causation of chronic metritis, Scanzoni has expressed

an authoritative opinion. "After many weeks of unsatisfied sexual desire, the young married pair, now freed from all restraint, give themselves up to the joys of love; the intense sexual excitement causes great stimulation and hyperæmia of the female sexual organs; in addition, the noxious influences of travel make themselves felt, and also hygienic indiscretions are perpetrated, dependent upon the young wife's modesty; it is, therefore, by no means to be wondered at that, having left home a perfectly healthy woman, she returns from her wedding journey with the germs of an illness from which she never fully recovers, and which is the source of unending suffering, and more particularly of a sterile marriage."

Sexual hygiene demands a certain moderation in the enjoyment of physical love, and also a certain constancy, such as may be expected in a happy marriage.

It is not possible to lay down a general rule with regard to the frequency of sexual intercourse, notwithstanding the earnestness with which religious zealots, physicians, and moral teachers have in all ages endeavored to determine how often it was proper for a man to cohabit with his wife. The rules that have been prescribed by the various authorities had in view, for the most part, the protection of the wife from excessive demands on the part of her husband; sometimes, however, by the establishment of a minimum period, a certain amount of sexual gratification was secured to the wife; finally, also, the generation of a healthy posterity had to be taken into consideration. Ribbing, however, justly observes: "Sexual intercourse results from a natural impulse, and he whose senses are unimpaired, and who has learned, at the same time, amid the tumult of his sensations, to preserve proper consideration for his wife—such a man runs little danger of making any

mistake. In opposition to the opinion of many, I regard it as entirely right and reasonable that husband and wife should have intercourse whenever physically and mentally impelled to that act. Nor do I see any reason why, during the first period in which they are able to enjoy without intermission the pleasures of sexual intercourse, they should, in accordance with any theory whatever, impose on themselves further restraints than those demanded by care for their physical and mental health. The touchstone of marital hygiene is this, that on the day following intercourse both husband and wife should feel perfectly fresh, vigorous, and lively, alike in body and mind—even more so, perhaps, than on other days. In the absence of such feelings, we may feel assured of the occurrence of sexual excesses." The same author quotes a saying of Pomeroy's: "We may quaff the nectar as freely as we will—nature herself mixes the draught and holds the goblet to our lips; if, however, we drink too much, she first dilutes the draught with water, later adds gall, and ultimately perhaps deadly poison."

The occupation, trade, or profession, and the nutritive condition and physical constitution of the married pair, have an important bearing on the frequency with which, without detriment to health, cohabitation is permissible. The rules of the Hebrew Talmud already take these circumstances into account, ordering as they do that young and powerful men not engaged in any regular occupation shall have intercourse with their wives daily; manual laborers, on the other hand, once a week only; whilst brain-workers, finally, or those whose work is extremely arduous, should allow an interval of one or more months to elapse between the acts of intercourse. Acton also prescribes that in the case of brain-workers and of those manual workers

whose labors are exhausting, intercourse must not occur more frequently than once every week or ten days.

The married couple should understand how to impose on themselves a certain restraint in the matter of marital intercourse, without, however, going so far as on altogether trifling grounds to refuse the husband access to his wife. In this respect, also, the opinions that have recently come to prevail concerning the rights of women have had an influence. W. Acton relates a case that came under his observation in which the wife refused to allow her husband any voice in determining when and how often intercourse should take place; the wife, she maintained without hesitation, since she had to bear the consequences of intercourse, was fully justified, whenever she thought fit, in refusing her husband's embraces.

The dangers to the sexual life of woman which are involved by the modern woman's rights agitation are seen already in the changes which the emancipation of women in North America has produced in the functions of woman as wife and mother. In that part of the world, everything possible has been done "to transform" (to quote the words of a brilliant journalist) "the doll into an independent existence, to enable the helpless woman to earn her own subsistence, and the result of these endeavors has been most striking. The American woman has obtained the right to enter every profession and to follow every kind of occupation which have hitherto been reserved for men; she is physician, lawyer, merchant, professor; her boudoir has become an office, often connected with the stock exchange by a private wire. Legally, also, she now possesses the same rights as man; in many States she has both the suffrage and the right of entering the House of Representatives; she has fully emancipated herself

from her former condition of tutelage, and in her shrillest tones can cry to heaven 'I am free, I am independent, I am emancipated, I am myself!' And observe, as the result of all these attempts at the conversion of woman into man, that in the matter of marriage also she acts as if she were no longer woman. The American woman no longer marries; perhaps, indeed, because she no longer has the capacity. So long and so eagerly has she given herself up to masculine occupations, that her inward feminine nature has also perhaps undergone transformation, so that she has become affected with a kind of neutral lack of desire. Unquestionably, the desire for marriage on the part of this modern 'emancipated' woman has vanished in the most alarming manner, there is a notable fall in the birth-rate, and the indigenous (white) population actually threatens to disappear."

The wife acts wisely, not on hygienic grounds alone, in not always acceding at once and unconditionally to her husband's demand for the repetition of intercourse. Her modest reluctance enhances her desirability in the eyes of her amorous husband. Thus, Shakespeare makes Posthumus exclaim (*Cymbeline*, Act II., Sc. 5, i. 9):

"Me of my lawful pleasure she restrained
And prey'd me oft forbearance; did it with
A pudency so rosy the sweet view on't
Might well have warmed old Saturn."

Especially justified is such refusal when coitus has been already once or twice performed, or when the consumption of alcoholic beverages has made the husband unduly lustful. On the other hand, the refusal of intercourse when demanded by the husband should never depend upon baseless feminine caprice, or upon the now so frequently asserted "rights of women."

Experience has long ago established as a fact that unduly frequent satisfaction of the sexual impulse entails serious consequences to the health of the individual. And in the case of the wife these consequences may be especially disastrous when intercourse is indulged in recklessly during menstruation, during all stages of pregnancy, and even during the puerperium. "Incontinence during menstruation leads to serious circulatory disturbances and to the consequences of these disturbances; during pregnancy it is likely to give rise to miscarriage; during the puerperium, to congestions and inflammations. Should conception occur as a result of intercourse during the lying-in period (and this may happen very shortly after childbirth), abortion, and even more serious consequences, are likely to ensue. By intercourse during lactation, the premature recurrence of the menstrual flow is induced, and the gradual reversion of the reproductive apparatus to the condition in which it was before pregnancy (the process of involution) is hindered; moreover, the secretion of milk is diminished or even entirely suppressed." In these terms Hegar depicts the consequences of premature resumption of marital intercourse, taking perhaps a somewhat extreme view of the matter.

Nevertheless, this author is undoubtedly right in declaring that one of the principal disadvantages to a woman of excessively frequent sexual intercourse is that pregnancy occurs too often. It is astonishing to observe the number of full-term deliveries and miscarriages that a woman will experience within a comparatively short period of time, as is seen too frequently among the laboring classes and more especially among factory workers. "If we assume the ordinary mortality of childbirth to be 6 per mille, a woman who in the course of 15 years undergoes labor (at

full term or prematurely) 16 times, runs a risk of death to be expressed by the ratio of $6 \times 16 = 96$ per mille; that is to say, on the average, of 1,000 women who become pregnant as often as this, nearly 1 in 10 will die in childbed."

Young men who have previously suffered from gonorrhœa and who wish to marry, must, unless they wish to cause unspeakable misery, undergo an exact and thorough examination; not only must the physician inquire as to the presence of certain symptoms, such as smarting during micturition, adhesion of the lips of the urethral meatus, "clap-threads" in the urine, etc., but during a considerable period of time repeated microscopical examinations of the urine must be undertaken, and the filaments, if present, must be examined for gonococci. The physician will also have to determine whether any vestiges remain of epididymitis, and whether the quality of the semen has been impaired by the attack of gonorrhœa. Unfortunately, it is not yet within our power absolutely to forbid marriage to a man exhibiting all the symptoms of chronic gonorrhœa; but it is the duty of the physician to explain to such a man the scientific views regarding this matter that now prevail, in order to furnish him with the grounds for a decision.

It is not possible, when discussing the hygiene of married life, to preserve silence respecting the extremely pressing question of the use of measures for the prevention of conception, for in recent years their use has become extraordinarily general, chiefly, indeed, in the upper and middle classes of society, but to some extent also among the working-class population. We must here express the opinion that, except in certain instances in which their employment can be justified on carefully weighed and well-established

medical grounds, the use of any mechanical or chemical means for the prevention of conception must be dis-countenanced as injurious to health. The wife who wishes to preserve her psychical purity and moral chastity, which is not only possible in marriage, but also greatly to be desired, must not concern herself much with the technique of the sexual life, but must give herself up to sexual enjoyment only as the result of a delicate and immediate bodily and mental desire. Not only for reasons of national economy regarding the means of providing for the family, but also for well-grounded personal reasons regarding the wife's health, must the latter be spared an unduly rapid succession of pregnancies and confinements. And this should be effected by a certain degree of continence and by the observation of extensive periods of sexual quiescence.

To preserve a woman's health during the acme of her sexual activity, a careful general hygiene is an important requisite. The dwelling should be dry and roomy; above all, the bedroom should not be too small, neither damp nor dark, and it should be well ventilated. The wife's occupations should be so arranged as to afford a suitable alternation of activity and repose, and there should be as little night work as possible. Certain occupations are especially potent in the causation of the diseases peculiar to women, principally for the reason that they do not permit of the requisite repose during menstruation. Thus, washerwomen, vocalists, and sewing-machine operatives, suffer with especial frequency from diseases of the genital organs.

Great care in the cleansing of the genital organs is indispensable in the case of women; the vulva and its environment should be frequently and carefully washed; and an occasional vaginal injection is ad-

vantageous. As regards the last-named measure, however, we must point out that it is possible to err by excess as well as by defect, and that a daily vaginal douche can by no means be regarded as a necessary part of the hygiene of the reproductive organs. For recent researches have shown, on the one hand, that the vagina constitutes a natural mechanism for the destruction of pathogenic organisms, and on the other hand, that complete disinfection of the vagina is extremely difficult to effect. Inflammations of the vulva, which are somewhat frequent in consequence of excessive perspiration and undue discharge from the genital canal, demand careful cleansing with soap and water and the use of a soft brush. The addition to the water of lysol (in the proportion of $\frac{1}{4}$ to $\frac{1}{2}$ per cent.) is advantageous. A general bath or a local sitz-bath, the water being moderately warm (95° to 99° F.; 35° to 37° C.), may be recommended on grounds of beauty as well as of health, and should be taken at least once a week.

The regular use of lukewarm sitz-baths is a most valuable hygienic measure for the prevention of various general or local disturbances consequent upon increased flow of blood to the genital organs. These local baths are best taken at a temperature of 95° F. (35° C.), and should last twenty minutes; they should be taken just before going to bed, and while sitting in the hip bath the skin of the abdomen and of the lower part of the back should be rubbed with the hand encased in a friction-glove. The bather on leaving the bath should get straight into bed, and should dry herself beneath the bedclothes, rubbing the skin till it glows. Such sitz-baths serve also to keep the external genitals clean, and to guard against infection. For vaginal douching, water sterilized by boiling should be employed, and where any catarrh of the vaginal mucous

membrane is present, some alum, permanganate of potassium, or boric acid may be added with advantage; the pressure of water, when a vaginal douche is given, should never be high, the reservoir of the irrigator being raised not more than twenty inches above the outlet of the nozzle; as a rule, the water should be lukewarm; the patient should be in the recumbent posture. The reservoir of the irrigator and the intra-vaginal nozzle are most suitably made of glass, to insure cleanliness; the nozzle should not be thrust too far in, two inches being quite sufficient. After the use of the douche, the woman should remain ten or fifteen minutes in the recumbent posture.

In addition to the hygienic employment of such full baths and local baths, a number of mineral baths have important therapeutic applications in cases of disease of the female genital organs, the traditional value of such baths having been scientifically endorsed by the modern science of balneo-therapeutics. By means of suitably selected mineral water baths, a powerful derivative stimulus may be given to the skin, and the affected reproductive organs may thus be beneficially influenced. Further, in acute inflammatory conditions or hyperæmia of the uterus or its annexa, these baths have an antiphlogistic influence; on the other hand, when intrapelvic exudations have formed, the baths promote the absorption of these inflammatory products; again, in congestive states of the female genital organs, with relaxation, thickening, and hypersecretion of the genital mucous membrane, the baths have an astringent and tonic influence on the tissues; finally, they have a favorable effect on the innervation and nutrition, not only of the reproductive apparatus, but of the entire organism. It is easy to understand why women during the menacme are frequent visitors to spas.

At this period of life, and especially in women who lead luxurious "society" lives, the thoughts tend strongly in the sexual direction; to avoid this, and to prevent the ever more and more frequent breaches of marital fidelity, the best means are the practice of vigorous bodily exercises, and active employment, either in household affairs or in intellectual occupations. Cold sponging of the body or cold full baths will also be found an excellent measure for the prevention of sexual excess. In such cases also the diet should be limited, strong and stimulating food should be avoided, but little butcher's meat should be taken, whilst green vegetables and raw and cooked fruits should be liberally consumed; at the same time, all alcoholic beverages must be rigidly prohibited. Moreover, care must be taken that during the night there should be no undue physical stimulation in consequence of excessively warm and soft bedding; hair mattresses are to be preferred to feather beds, with light down quilts for a covering. Finally, no stimulation of an erotic character should be offered to the imagination, and for this reason equivocal literature and lascivious dramatic representations must be avoided. By a sufficiency of occupation, regular, interesting, and demanding a considerable expenditure of physical energy, a woman may be enabled to a great extent to escape the inconvenience and distress attendant on entire or partial lack of gratification of the sexual impulse.

It cannot be disputed that a certain and moderate amount of sexual gratification is requisite for the perfect maintenance of physical health in woman, and that the absence of this gratification, or the gratification of the impulse in an abnormal or incomplete manner, entails disturbance of alike the mental and the physical equilibrium; but, on the other hand, the deleterious

consequences of sexual abstinence have been greatly exaggerated by many writers—both by physicians and social economists. Owing to the fact that to the cultivated woman sexual gratification is possible only in the married state, whilst social conditions render marriage impossible to many women greatly in need of such gratification; in consequence, also, of the modern and ever more widely diffused practice by husbands of coitus interruptus—altogether regardless of the woman's need for complete sexual gratification—there arise in women numerous local disorders and nervous disturbances, hysteria and even insanity being results by no means infrequent. The significance of ungratified sexual impulse in the pathogenesis of nervous disorders has been established by von Krafft-Ebing, who points out that in unmarried women insanity most frequently occurs between the ages of twenty-five and thirty-five years, during the decade, that is to say, in which youthful bloom and the hopes of marriage simultaneously disappear; whereas in the male sex the greatest incidence of insanity is between the ages of thirty-five and fifty years, the period of life in which the struggle for existence is fiercest.

Hegar, on the other hand, is a firm opponent of the view that the favorable influence of marriage is overrated. According to this author, the favorable effect of marriage in respect of mental disorders is to be found, not in the gratification of the sexual impulse, but in the ethical factors of marriage. Statistics show that even in the favorable circumstances of marriage, sexual gratification has in women an unfavorable influence, inasmuch as the proportion of sufferers from mental disorders is higher among married women than it is among married men. A study of the mental disorders which in women are especially associated with

the process of reproduction (puerperal mania) confirms this impression. Hegar insists that he has never seen nymphomania arise in women in consequence of forcible repression of the sexual impulse, but that he has not infrequently seen this disorder result from unnatural excesses or from long-continued sexual irritation, especially in hereditarily predisposed persons.

Such unnatural stimulation of the female is not infrequently practised by the male—by the lover and even by the husband—it may be because he himself derives pleasure from such perverted practices, and wishes to obtain sexual gratification without the risk of impregnation, or because he is himself incompetent for normal complete intercourse. Hegar is further of opinion that in the causation of hysteria and also in that of chlorosis the repression of the sexual impulse plays a quite subordinate rôle. And he regards as pure fable the belief that continence in women is liable to lead to the formation of mammary, uterine, or ovarian tumors. He would more readily incline to the contrary opinion; the reproductive process being in this respect distinctly disadvantageous to the female sex. The unfavorable influence of the reproductive process is shown most clearly in the case of carcinoma of the uterus; the majority of the patients suffering from this disease are either married or widowed, and many of them have given birth to a large number of children. "Gratification of the sexual impulse, and more particularly the reproductive process, give rise in women to the formation and growth of tumors, cause numerous mechanical disturbances, and open the way to infection with various pathogenic organisms."

Hegar considers that there is hygienic justification for the limitation of the number of children to which a woman gives birth. The most suitable age for

motherhood lies in his opinion between the ages of twenty and forty years. Childbirth in women younger or older than this entails too much danger both to mother and child. At least two and a half years ought to elapse between two successive births; and these figures give us eight as the maximum family. If we assume that the duration of pregnancy is nine months, and that of lactation nine to twelve months (or in cases in which the mother does not nurse her own infant, that a like period must be devoted to the careful supervision of the wet-nurse or of the methods of artificial feeding), we cannot consider it unreasonable to devote a further period of from six to nine months to the complete re-establishment of the woman's health. "Moreover, woman does not exist solely for the purpose of subserving during two decades of her life the processes of reproduction. And to permit the maximum number of children to be as great as eight, we must presuppose that the woman is in perfect health, and that she lives in a perfectly healthy environment. Any illness or infirmity which renders the duties of house-keeping and the rearing of the existing family unduly difficult, indicates the need for a further limitation of childbearing. And if the reproductive function is to be rationally controlled, we must above all attend to the age and the health of the parents. Occupation, habitation, and general environment have also to be considered. The correct ideal is indeed not difficult to discover."

Hegar concludes that strict moderation and even absolute continence in sexual matters are often, and for long periods of time, a pressing duty. "The numerous and various disasters which are brought upon the world by unbridled and unregulated sexual passion can be prevented only by enlightenment, moderation,

and continence. If marriage were postponed until the attainment of complete physical maturity, in women till the age of 20, in men till the age of 25, while at the same time procreation were no longer undertaken by women above the age of 40 or by men above the age of 45 to 50 years; if, again, between successive pregnancies a sufficient pause for the woman's recuperation were insisted upon, and intercurrent illnesses and states of debility were taken into account; and if, finally, sickly individuals, those hereditarily predisposed to disease, and those in any way below par either mentally or physically, were more than heretofore prevented from marrying, then the increase of population, which in Germany is unquestionably too rapid, would to some extent be checked. Thoroughgoing regulation of the reproductive process will not, however, be thus attained without the adoption of a method of selection too rigorous for present-day notions; and for a further advance we must in the meantime depend upon moderation and continence." As regards the modern demand of the "right to love," the same experienced gynecologist writes: "Whoever preaches to mankind the doctrine that 'a man sins against his own personality if he neglects to exercise every limb he possesses, and if he denies himself the gratification of every natural impulse,' or the doctrine that 'it is the duty of every human being to gratify all his natural impulses, since these are most intimately inter-connected with his personality—are indeed his personality itself'; such a preacher does harm to his kind. Such rights and such duties are chimerical for this reason, if for no other, because two persons are necessary in the case of sexual gratification, and sometimes—though not as often as might be wished—Hansel fails to find his Gretel, without any consequent loss to society at large."

'An especially important chapter in the history of woman at this period of life relates to the dietetics of pregnancy and parturition, and to the regulations to be observed for the maintenance of health at this time and in connection with the processes of pregnancy, parturition, puerperal involution of the uterus, and lactation. This subject cannot now, however, be considered at length, and for our present purposes it is sufficient to point out how important it is alike for mother and child, alike for family and society, that the ever more and more widely and generally diffused practice of the artificial feeding of infants should be abandoned, and that there should be a return to the natural method according to which each mother nurses her own infant. The prevailing custom costs every year thousands of mothers their health, and thousands of children their lives.

COPULATION AND CONCEPTION

Copulation

The reproduction of the species is effected by means of an act of copulation on the part of a male and a female individual, both of whom must have attained complete sexual development. In all the sequence of reproductive processes it is copulation alone that is a voluntary act, all the other processes being independent of the will and even of consciousness.

A characteristic difference between man and the lower animals lies in the fact that in the human species sexual pleasure and the act of copulation may occur at any season of the year; and a further characteristic difference may perhaps be found in the fact that in the great majority of individuals of the human species the psychical process of "love" plays a determinative part.

Voltaire pointed out that to man alone among animals are known the embrace and the joy of the kiss.

In this act of conjugation between two individuals of the same species, differentiated each from the other by the characteristics of sex, the active, provocative rôle is allotted to the male, the passive, receptive rôle, to the female. The modest and coy reluctance characteristic alike of the maiden and of the wife, promote an increase of sexual excitement in the opposite sex, and this not only in a man of purely sensual character, whose vanity is stimulated by his being the chosen one among many—a circumstance which, in view of the great dependence of the sexual act upon psychical processes and imaginative influences, is by no means devoid of importance. The woman's coy reluctance must be overcome by means of a tender strategy before she is willing to grant the final possession of her body; and the act of copulation forms at the same time the conclusion of the physical and mental yearnings of the lover, and the commencement of the new-coming being.

Conception

The union between ovum and spermatozoon, whereby fertilization is effected, appears to occur in the human species, as a rule, in the outer third of the Fallopian tube, the ampulla of this structure serving to store the semen for a considerable period; in the lower animals, the usual occurrence of fertilization in this region has been established by direct observation. The open mouth of the tube receives the mature ovum, guided thither from the ovary by appropriate movements of the ovarian fimbriae; these movements have been seen in active occurrence in the guinea-pig by Hensen. Once within the tube, the onward movement of the

ovum is effected by the cilia of the epithelium lining of the canal.

His has formulated the theory that in the human species fertilization is possible only in the uppermost segment of the tube; an assumption that is probable enough, but cannot be regarded as definitely established. An analogy certainly exists among the lower divisions of the animal kingdom, for Coste, His, and Ohlschläger have proved that an ovum which passes through the Fallopian tube without being fertilized, undergoes notable alterations. Further, Coste has shown, in the case of the ovum of the domestic fowl, that this is no longer capable of being fertilized after it has passed through the upper segment of the oviduct. Other authorities, however, namely Löwenthal, Mayrhofer, and Wyder, oppose the extension of this rule to the human species. Löwenthal assumes that in the human female, fertilization ordinarily occurs in the cavity of the uterus, in the wall of which the unfertilized ovum has already embedded itself; and he supports his contention by the statement that spermatozoa are not to be found in the Fallopian tubes or on the surface of the ovaries. Mayrhofer and Wyder point out that the movement of the cilia of the ciliated epithelium is in the interior of the uterus in an upward direction, but in the Fallopian tubes is downward in the direction of the uterus.

The contention of Löwenthal was disproved by Birch and Hirschfeld, who, in a prostitute dying during the act of intercourse, found, fifteen hours after death, living spermatozoa in the Fallopian tubes. On the other hand, more recent investigations, those, for instance, of Hofmeier, Mandl, and Bonn, have confirmed the data given above with regard to the direction of the ciliary movement in the interior of the genital passages. Moreover, O. Becker has shown that the cili-

ated epithelium of the tubes extends over the fimbriæ and even on to the adjoining pavement epithelium of the peritoneum; and he believes that the ciliary movement of this region keeps up a constant current, the purpose of which is to sweep the ovum into the ostium of the tube, and thence down toward the uterus. Lode has adduced positive experimental evidence of the occurrence of such a movement of translation.

The general result of anatomical investigation is, that the conjugation of the ovum with the spermatozoon takes place in the ampulla of the Fallopian tube; but it is established that fertilization may also take place lower down in the tubes, or in the uterine cavity, or even on the surface of the ovary, *i.e.*, in the abdominal cavity.

The fertilization of the mature ovum—maturation having occurred within the ovarian follicle before its rupture—has been shown by numerous researches on the ova of other animals to consist in the fusion of the male and the female nuclear substance; and it appears that of the enormous number of spermatozoa, estimated by Lode at 226 million at a single ejaculation, that enter the female genital passage, but a single one penetrates the ovum. Toward the head of this spermatozoon there extends from the surface of the ovum a process, flat at first, but becoming more and more prominent, until it surrounds the head, and fuses with it. The motile tail of the spermatozoon disappears, whilst the head, which has now passed through the vitelline membrane and entered the ovum, assumes the appearance of a nucleus, and is called the *male pro-nucleus*. The original nucleus of the ovum has previously prepared itself for fertilization by the extrusion through the vitelline membrane of portions of its substance (known as *polar globules*), and now constitutes the *female pro-*

nucleus. Toward this latter, situated somewhere near the centre of the cell, the male pro-nucleus continues to move, the vitelline granules meanwhile being disposed round about it in radiating lines, forming a star-shaped figure. Having come into contact, the two pro-nuclei fuse completely to form a new nucleus, the nucleus of the now fertilized egg-cell. The result of fertilization is the formation of the first *segmentation-sphere*, from which, by further subdivision, the new individual is formed. Thus is effected that which Hippocrates describes in the words: "The seed possessed both by man and by woman, flow together from all parts of the body; the fruit is formed by the mingling of the two seeds."

The most favorable period for the occurrence of fertilization appears to be when intercourse takes place from eight to ten days after the termination of the menstrual flow. In 248 instances in which the date of the fruitful coitus was exactly known, it was ascertained by Hasler that in 82½ per cent. of all cases, conception was effected in the fourteen days succeeding the menstrual period. In general it may be stated that the theory of the periodicity of ovulation and of the causal relation of this process to menstruation, has not been shaken by the result of researches recently undertaken by opponents of that theory; hence it appears that the fertilized ovum is the ovum of the last completed menstruation.

Already in the writings of the old Indian physician Susruta, we find expression of the view that the period that immediately succeeds the cessation of the menstrual flow is one most favorable to conception. "The time of generation," he says, "is the twelfth night after the commencement of menstruation." In the Jewish *Talmud*, the day before the onset of menstruation, and the

days immediately succeeding the cessation of the flow, are indicated as those most favorable to the occurrence of conception; moreover, in the *Talmud*, notwithstanding the fact that intercourse during menstruation is prohibited on pain of death, and that coitus is not regarded as permissible until the lapse of twelve clear days after the cessation of the flow, nevertheless the assertion is made that intercourse during menstruation may lead to conception.

Soranus writes to a similar effect: "Just as the soil is suitable only at certain seasons for the reception of the seed, so also in the human race intercourse does not always take place at a time suited for the reception of the semen. To be effective, coitus must occur at the proper time. . . . The act of intercourse that is to lead to conception may best occur either just before or just after the menstrual flow, when, moreover, there is strong desire for the sexual embrace, and neither when the body is fasting, nor when it is full of drink and undigested food. The time before menstruation is, however, unsuitable, for then the womb is heavy from the flow of blood, and two conflicting tendencies will come into operation, one for the absorption of material and the other for its outflow. During menstruation, again, conception is unlikely to occur, for then the semen is wetted and washed away by the flowing blood. The sole proper time is that immediately after the flow, when the womb has freed itself from its humors, and warmth and moisture stand in harmonious relationship."

Among many of the castes of Hindustan, it is a religious ordinance that on the fourth day of menstruation a man shall have intercourse with his wife, "since this day is that on which conception is most likely to occur." Indian physicians advise, in order to bring

about conception, "that coitus be effected always as soon as the menstrual flow has ceased, at the end of the day, and when the lotus has closed." In Japan, medical opinion is to the effect that a woman is capable of conceiving during the first ten days after menstruation, but not later (Ploss and Bartels).

The view that the first days of the inter-menstrual interval are those most favorable to the occurrence of conception, is further confirmed by the statistical data collected by Löwenfeld, Ahlfeld, Hecker, and Veit; and it appears that as the date of the next menstruation is approached, there is a continual decline in the frequency of conception; just before the flow, conception hardly ever occurs. Hensen, from the records of 248 conceptions in which the date of the fruitful intercourse was exactly known, draws the following conclusions:

1. The greatest number of conceptions follow coitus effected during the first days after the cessation of the menstrual flow.
 2. When coitus is effected during menstruation, the probability of conception increases day by day as the end of the flow approaches.
 3. The number of conceptions following coitus effected shortly before menstruation is minimal.
 4. However, there is no single day either of the menstrual flow or of the inter-menstrual interval, on which the possibility of the occurrence of conception can be excluded.
- Feokstitow has drawn up from statistical data an ideal "conception-curve," which teaches that conception most readily ensues upon coitus effected soon after the end of the menstrual flow, in the first week, that is to say, of the inter-menstrual interval; moreover, the curve shows that the highest percentage of conceptions

occurs on the first day after the cessation of the flow, and that after this day the percentage of conceptions declines. The percentage frequency of conceptions from coitus effected on the last day of menstruation, and on the first, ninth, eleventh, and twenty-third days, respectively, of the inter-menstrual interval, is expressed by the ratio of 48:62:13:9:1; and between the points given, the course of the curve is almost rectilinear. The probability of the occurrence of conception on the twenty-third day of the interval (on which day the curve reaches its lowest point), is one-sixty-second of the maximum probability.

Normal semen is a whitish, semi-transparent fluid, of the consistency of thin cream. It contains aggregations of a nearly spherical shape, consisting of a vitreous, transparent, colorless or light yellow, gelatinous, elastic substance. Under the microscope this substance has a hyaline appearance, and exhibits in its interior innumerable clear spaces of varying size, which are apparently filled with a clear fluid. Not infrequently, these spaces are extremely narrow and therewith greatly elongated and disposed in parallels, so that the whole substance thus obtains a striated appearance. When treated with water, this material becomes whitish and non-transparent, and assumes under the microscope a finely granular aspect. When allowed to stand without agitation for twenty-four hours, this substance dissolves and becomes so intimately mingled with the seminal fluid that it can no longer be clearly differentiated therefrom. In all probability it is merely a secretory product of the seminal vesicles. The semen contains spermatozoa in countless numbers.

Cardiac Troubles Due to Sexual Intercourse

Among the troubles from which women at times suffer as a result of sexual intercourse, certain cardiac disorders are especially worthy of attention.

Every act of sexual intercourse in a young and sensitive woman exercises an exciting influence on the nervous mechanism controlling the cardiac movements, and this influence is more clearly manifested in a degree directly proportional to the intensity of the sexual orgasm. The heart's action is markedly increased in frequency, the cardiac impulse is more powerful, the large arteries of the neck are seen to pulsate far more vigorously, the conjunctiva is markedly injected, the respiration is increased in frequency, the respiratory movements are more superficial and have a panting character.

But when, in a woman who is sexually irritable in an excessive degree, the peripheral stimulation occurring in the act of sexual intercourse is unusually powerful, there may result a notable increase or modification of the reflex manifestations which normally occur during sexual intercourse in the province of cardiac activity; similar results ensue when there is a summation of stimuli owing to excessive sexual intercourse, or contrariwise when the act of intercourse is broken off just before its physiological climax and the natural termination of the orgasm fails to occur.

The former cause is not infrequent in young wives during the period of the honeymoon. The latter cause is in operation when there are diseases of the female reproductive organs preventing the physiological completion of intercourse; but especially in consequence of the modern practice of coitus interruptus, in which the man breaks off the act of intercourse the moment

he feels that ejaculation is imminent, without troubling himself regarding the natural course of sexual excitement in the woman. Yet another cause of excessive cardiac reflex manifestations in women is incomplete potency of the male, which may either cause a premature ejaculation of semen, or may lead to incomplete penetration of the penis.

In all such cases, as a result of sexual intercourse, there may arise cardiac disorders of various kinds; among these, tachycardial paroxysms are the most frequent, occurring either *inter actum*, or at a longer or shorter interval after intercourse.

In several cases of vaginismus occurring in young married women which have come under my notice, it was observed that the attempts at intercourse gave rise to violent involuntary spasmodic contractions of the constrictor cunni and the other muscles of the urogenital and anal regions, and in addition it was found that these attempts were followed by tachycardial paroxysms with dyspnœic manifestations, lasting for a considerable period, it might be as long as one or two hours.

In women who had practised coitus reservatus for a prolonged period, in fact for several years, in such a manner that, notwithstanding the occurrence of intense voluptuous excitement, complete sexual gratification rarely, if ever, occurred—in such women, in whom these marital malpractices seemed to have profoundly influenced their psychical life, I have frequently witnessed a form of reflex cardiac disorder which I must regard as a variety of the multiform neurasthenia cordis vasomotoria. In such women, still at the climax of their physical powers and of their sexual needs, attacks of palpitation suddenly occur at irregular intervals, several times daily or less frequently. Associated with

this increased frequency of the cardiac activity are an extremely distressing feeling of anxiety, a sensation of faintness, headache, vertigo, a weakness of the muscular system, and at times actual attacks of syncope. Physically, the women are extremely depressed, irritable, inclined to weep, unhappy, and weary of life. At the same time, digestion is impaired, the appetite is small, and there is constipation. The pulse is in most cases feeble, small, of low tension, easily compressible, increased in frequency, often intermittent, sometimes more distinctly arhythmic. The heart is found to be sound on physical examination, nor can any abnormality be detected in the great vessels. The lower extremities are free from œdema; the urine does not contain albumin.

Women thus affected are sometimes believed to be suffering from cardiac disorder, in other cases they are subjected to various modes of gynecological treatment; until at length the physician, by appropriate questions, becomes enlightened regarding the true cause of the cardiac disorder, namely, coitus interruptus. If it is possible to prohibit effectually this unwholesome practice, the cardiac symptoms soon cease to recur.

Finally, in women at the climacteric age, cardiac troubles sometimes ensue, which are dependent on interference with sexual intercourse in consequence of anatomical changes in the vagina; changes of this character frequently occur at the time of the menopause; owing to hyperæmic or inflammatory processes, a partial or general stricture of the vaginal passage results; in many cases this passage becomes narrower, shorter, and almost conical in shape, whilst the vaginal inlet is greatly diminished in size. Such a vaginal stricture, which Hegar has also seen in younger women after an artificial climacteric (oophorectomy), inter-

fers with sexual intercourse; and the incomplete sexual gratification gives rise to a series of nervous manifestations, and, among others, to the above described reflex cardiac neurosis.

Whether, and in which cases, the cardiac disorders evoked as a result of the local stimulatory influences of sexual intercourse, are dependent on a reflex stimulation of the sympathetic nerve on the one hand, or upon a transient paresis of the inhibitory centre of the heart and of the vasomotor centre on the other, cannot here be fully discussed; just as little can we consider in what manner the psyche is sympathetically affected by the irritative processes in the genital organs, and its functional activity thus impaired.

Here I can do no more than briefly state that experience has taught me that sexual intercourse is competent to originate cardiac troubles in women.

1. In extremely sensitive, sexually very irritable women, tachycardial paroxysms may result from sexual excesses.

2. Tachycardial paroxysms with dyspnœa occur in young women affected with vaginismus; also in women at the climacteric with constrictive changes in the vagina.

3. Cardiac troubles, characterized mainly by symptoms indicating diminished vascular tone, occur in women who have long practised coitus interruptus with incomplete gratification of their voluptuous desires.

Dyspareunia

In normal conditions the act of sexual intercourse is accompanied in women, as in men, by a voluptuous sensation, and this sensation must be regarded as a necessary link in the chain of those processes by which

gratification of the sexual impulse—the most powerful of all our natural impulses—is obtained. The absence of this voluptuous sensation in a woman, the state in which she experiences during coitus no voluptuous sensations, but feels either apathy, or positive distaste, is termed dyspareunia: in former times it was also known as anaphrodisia. This abnormal state of sexual sensibility, which up to the present is hardly alluded to in gynecological text-books, has received remarkably little attention from the medical standpoint, and its importance has been underestimated. Most unfortunately so, for dyspareunia is an important symptom, exercising a powerful influence on the general health of the woman who suffers from it, upon her social status in marriage, and, as is easy to understand, upon her procreative capacity.

Dyspareunia must be clearly distinguished from two somewhat similar conditions, with which at first sight it is liable to be confused, namely, from anæsthesia sexualis, and from vaginismus. By sexual anæsthesia we understand, as previously explained, the absence of the sexual impulse, a symptom which, when the reproductive organs are normal in structure and function, is either of central nervous origin, a result of disease of the brain or spinal cord, or else is due to general nutritive disorders such as diabetes, morphinism, or alcoholism. A woman affected with dyspareunia does, however, experience the sexual impulse, it may be very actively, but sexual intercourse brings about no gratification of her desires. In vaginismus, on the other hand, the introduction of a foreign body, that is to say of the membrum virile, into the vagina, gives rise to painful reflex cramps of the sphincter vaginæ, or of the muscles of the pelvic floor, whereby the completion of coitus is rendered impossible: whereas in dyspa-

reunia coitus can be effected, but gives rise to no voluptuous sensations.

The pleasure which normally occurs in woman during sexual intercourse is brought about in this way, that contact with and friction by the penis stimulates the sensory nerves of the clitoris, the vulva, the vestibule, and the vagina; this stimulus is propagated to the cerebral cortex, where it gives rise to voluptuous sensations, and then, by reflex stimulation of the genito-spinal centre, gives rise to a series of reflex discharges. The pudic nerve, a branch of the sacral plexus, supplies the female external genital organs. Some of its branches pass in the clitoris to a peculiar form of nervous end-organ discovered by W. Krause, Krause's genital corpuscles: the structure of these corpuscles appears to fit them exceptionally well for the transmission of stimulatory waves to the nerve centres. "When this stimulus," says Hensen, in his work on the physiology of reproduction, "in addition to other effects, also gives rise to a voluptuous sensation, the cause must be sought in central nervous connections and apparatus. Similar relations are to be found in connection with the mechanism of nutrition, for example, in the association of hunger, appetite, agreeable sensations of taste, the act of mastication, and the secretion of saliva."

By means of this stimulus, several reflex processes are originated in the reproductive canal, the most notable of which are the erection of the clitoris, and the ejaculation of the secretions of various glands. The cavernous tissue of the clitoris is connected with that of the bulbus vestibuli, and the dorsal nerve of the clitoris is one of the principal nerves of voluptuous sensation. The venous plexus constituting the bulb of the vestibule lies at either side along the margin of the vestibule at the boundary between the labium majus and the

labium minus, and laterally it is covered by the constrictor cunni¹ muscle. During coitus the blood is driven out of this bulb into the glans clitoridis, and thus the sensibility and the erection of the glans are increased. The constrictor cunni and ischiocavernosus muscles draw the clitoris, which is bent at a right angle downward, into contact with the penis. By means of the pressure of the constrictor cunni, the mucous secretion of Bartholin's glands, which open into the vulva at the back of the labia majora, is expressed.

As additional reflex actions, dependent upon the activity of the reflex centre in the lumbar enlargement of the spinal cord, there ensue contractions of the vagina, peristaltic movement of the tubes, some descent of the uterus, relaxation of the os uteri and rounding of this orifice, and induration of the portio vaginalis, whereby the tubal and uterine mucus and the secretion of the cervical glands are expressed. This process of *ejaculation* constitutes the culminating point of the voluptuous sensation occurring in the sexual act; this act thus exhibits two phases—the sensation of friction, and the sensation of ejaculation.

With regard to voluptuous sensations, and processes analogous to pollutions, occurring in women, we append an extract from von Krafft-Ebing.

"The occurrence of voluptuous excitement during coitus is dependent in the woman, just as in the man, upon:

"1. The peripheral influence of the intensity and duration of the sensory stimulation (anæsthesia of the genital passage may be the cause of the absence of voluptuous sensation). 2. The condition of excita-

¹ *Constrictor Cunni Muscle*.—In women the *bulbocavernosus muscles*, right and left, form, as it were, a sphincter to the vaginal outlet. Hence the alternative names of *sphincter vaginæ* and *constrictor cunni muscle*. The latter name is in common use in Germany, but, though appropriate, is rarely employed in England.—TRANSL.

bility of the reflex (ejaculation) centre in the lumbar spinal cord. The activity of this centre varies within wide limits, not merely in different individuals, but in the same individual at different times. There are, indeed, women in whom it seems as if this centre were always in vigorous activity. In normal women, the irritability of the centre appears to be most marked at the menstrual epoch, and to decline rapidly soon after menstruation. In pathological conditions, the activity of the centre may be temporarily in abeyance (organic inhibitory processes, such as are seen in certain cases of hysteria with temporary frigidity); or again the centre may be abnormally active owing to irritable weakness (neurasthenia sexualis), in consequence of which ejaculation may, just as in the male in similar circumstances, occur too easily.

3. The occurrence of the voluptuous sensation in women is unfavorably influenced by psychical inhibitory perceptions (analogous to the inhibitory influence of psychical processes in the male, such as, for example, fear of incapacity to perform sexual intercourse). As examples of such inhibitory perceptions in women may be mentioned, dislike of the man, physical loathing to sexual intercourse, etc."

Gutzeit records interesting experiences, which are readily intelligible in view of what we have already quoted. He finds that of ten women after defloration, two only immediately experience full sexual pleasure. Of the eight others, four only have an agreeable sensation produced by the friction during coitus: but the sensation of ejaculation does not make its appearance until the lapse of at least six months, or it may be even several years, after marriage. In the remaining four women, pleasure during sexual intercourse may never become properly established. The women of the first

class are described by the author as being of a very ardent temperament, and passionately attached to their husbands. In such women, the sensation of ejaculation occurs during intercourse with any man toward whom they are sympathetic. Women of the second class are of a less ardent temperament, and are often comparatively indifferent toward the man with whom they cohabit. Women of the third class have little or no amatory feeling, and they either hate the man with whom they are cohabiting, or at least feel physical repulsion to the idea of intercourse with him. Gutzeit considers that meretrices usually belong to the third category. In the practice of their trade, they make a counterfeit of voluptuous enjoyment, and only experience real sexual gratification in intercourse with the man of their choice.

It is of great practical interest, alike from the gynaecological and from the neuropathological standpoint, to determine the consequences in women of ungratifying sexual intercourse. In the present state of our experience it must be assumed that the effect of abnormal sexual intercourse, that is of intercourse which does not culminate in gratification produced by the sensation of ejaculation, is deleterious. This is explained by the fact that, owing to the absence of the muscular contraction of the genital passage, the latter remains engorged with blood; the resultant hyperæmia passes away very slowly, and, when frequently repeated, gives rise to chronic tissue changes, manifesting themselves as diseases of the reproductive organs. Injury to the nervous system ensues, partly in consequence of these organic changes, partly also in consequence of psychical non-gratification in the widest sense of the term. The nervous disorders thus produced are typical forms of (sexual) neurasthenia; and in cases in

which the pathogenesis is predominantly psychical (antipathy to the husband, etc.) hysterical types of disorder are especially frequent. Von Krafft-Ebing believes that incomplete coitus, that is, coitus not culminating in the sensation of ejaculation, is a frequent cause of hysterical disorders in women.

When once the clinical picture of neurasthenia sexualis is fully developed, each act of intercourse (like pollutions or coitus in the sexually neurasthenic male) gives rise to renewed troubles, which are easily recognized as symptoms of venous stasis in the reproductive organs (sacrache, sensations of weight and bearing-down in the pelvis, fluor albus) : in addition we observe exacerbations of the lumbar spinal disorder, in the form of spinal irritation, irradiating pains in the sacral plexus, etc. In this way general neurasthenia develops. The conditions found in such cases on gynaecological examination (chronic endometritis, metritis, oöphoritis, etc.) are produced by the same cause as the nervous symptoms, namely, by an unhygienic mode of sexual intercourse. They are not the cause of the neurosis, but important concomitant disorders; and their effect in rendering the nervous disturbances more severe must be freely admitted.

Among important causes of ungratifying coitus must be enumerated: weak erection and ejaculatio præcox in the male, rendering the stimulation inefficient; in addition, coitus reservatus, coitus interruptus, and coitus condomatus. If the noxious influence is frequently repeated, the occurrence of neurasthenia sexualis and its consequences is greatly to be feared, and in women of neuropathic constitution it is practically inevitable.

Unsympathetic coitus appears to act, not merely in a somatic manner, but mainly upon the psyche, and to originate states of hystero-neurasthenia or pure

hysteria. If the influence of such unhygienic conditions of the *vita sexualis* co-operates with that of inherited or acquired sensuality, further dangers ensue: in cases of ungratifying sexual intercourse, the danger of manustupration; in cases of unsympathetic intercourse, the danger of psychical onanism or that of marital infidelity.

Although until recently the matter received but little attention, it must now be regarded as a well-established fact, that in the female (as in the male) the climax of voluptuous sensation in sexual intercourse is normally characterized by a process of ejaculation, accompanied by a voluptuous sensation of ejaculation, dependent upon the acme of excitement of a reflex centre in the lumbar enlargement of the spinal cord.

Just as in the male, this centre may be excited to action, not only by local stimulation of the genital organs, but also by (psychical) stimuli proceeding from the brain (pollutions), so also in the female a similar process may occur, and for this reason it is correct to speak of "pollutions in the female." Rosenthal appears to have been the first writer to speak of pollutions in women. In his clinical study of nervous diseases, Rosenthal described processes of the nature of pollutions, originated in erotically over-stimulated women by lascivious dreams. In one case he detected the outflow of a "mucous-like" fluid from the apparently intact genital organs; he believed this to proceed from the ducts of Bartholin's glands, and from the mucous glands surrounding the urethral orifice. Féré reports the case of a patient who had an erogenic zone in the region of the upper part of the sternum; pressure on this zone gave rise to a profuse secretion of vulvo-vaginal fluid. In this connection we may also recall the "clitoris-crises" to which tabetic women are

subject. Gutzeit described the process of pollution in women in the following words: "It is remarkable that in dreams such women experience the sensation of ejaculation."

The psychical preliminary is invariably constituted by lascivious dream perceptions. It merely remains open to question whether this process, which in the male is indisputably physiological, in the female may be said to occur within physiological limits. The researches published by von Krafft-Ebing more than twenty years ago, under the title "Concerning Processes Analogous to Pollutions Occurring in the Female," gave negative results as far as healthy individuals were concerned; on the other hand, the phenomenon in question was by no means rare in nervously disordered, and above all, in sexually asthenic women. The neurosis was in part found as a result of psychical or manual onanism in virgins with morbidly intensified libido: in part in married women, as a result of ungratifying coitus, as previously described: in part, also, in married women with powerful libido and enforced abstinence from intercourse, owing to acquired impotence or death of the husband.

Just as in the case of the neurasthenic male, these pollutions made the primary neurosis more severe, and relief from the nervous trouble was not obtained until the factor of the "pollutions" had been recognized, and made the object of special treatment. In exceptional cases the "pollutions" appeared to be the starting point of the entire neurosis.

It was further remarkable, again here displaying analogy with what occurs in the male, how much stronger and more deleterious was the shock-effect of an inadequate process of ejaculation occurring in a sexual dream, as compared with the far less deleterious

influence of similar incomplete ejaculation when occurring *via coitus*. In very severe degrees of neurasthenia sexualis, just as in the male, the waking imagination may give rise to a "pollution." In such cases the shock-effect on the nerve centres tends to be excessively severe. A still higher degree of irritability of the genital system appears to exist in cases in which excitement and orgasm of the reproductive organs may culminate in a "pollution" by purely spinal paths, without the intervention of the imagination. The significance of this fact would appear to be considerable for the proper comprehension and for the treatment of certain conditions of neurasthenia (sexualis) in the female. The "pollution" may here be the actual cause of the neurosis. But in any case, in the female, the occurrence of pollutions is an extremely important symptom as regards both diagnosis and therapeutics. It is extremely probable that hallucinations of coitus, and the complaints made by insane women of attempted violation during the night, are really dependent upon such "pollutions."

The frequent occurrence of pollutions in women, the so-called vulvo-vaginal crises and clitoris-crises, is regarded by Eulenburg as a striking manifestation of sexual neurasthenia in woman; in such cases a lascivious dream is spontaneously followed by a more or less abundant discharge of the clear gelatino-mucous secretion of Bartholin's glands. In women who masturbate, and in tribadists, a profuse and even violent secretion of these glands is produced by touching the clitoris or the erogenic zones at the entrance to the vagina, close to the orifices of Bartholin's ducts.

Dyspareunia, the absence of voluptuous sensation in women during coitus, may be referred to three fundamental causes:

1. Insufficient or completely wanting peripheral stimulation of the sensory nerve terminals in the female reproductive canal: in these cases the conducting tracts to the nerve centres never become active.

2. Diminution or cessation of the excitability of the reflex centre in the lumbar enlargement of the spinal cord: this leads to failure of the sensation of ejaculation.

3. Inhibitory influences proceeding from the cerebral cortex, whereby voluptuous sensations and perceptions are checked.

The first-named of these etiological influences is in my experience the commonest. Incomplete or quite inadequate stimulation of the sensory nerves of the genital canal may be due to the maladroit performance of copulation on the part of the male, owing to inexperience, or it may depend on gross disproportion in size between the reproductive organs of the man and the woman; in other cases it may be due to disease of the reproductive organs in either sex, influencing unfavorably the sensibility to stimulation of the nerves of the genital canal. Awkward or incomplete performance of coitus may thus lead to failure of voluptuous sensation, and this may ultimately pass into permanent dyspareunia. Temporary dyspareunia is very common in young wives during the first months of married life, ensuing on the pains of defloration; and very gradually gives place to normal voluptuous sensation. It may be one or two years after marriage before the sensation of ejaculation is first experienced. Not infrequently, dyspareunia depends on incomplete potency in the husband, who is incompetent to arouse voluptuous sensation in his wife. For this reason, dyspareunia is common in young women married to elderly men; but is common also, where (as is so frequent among Russo-Polish Jews) the men also marry

very young, at an age of from sixteen to seventeen years, and where, moreover, the husband has often before marriage impaired his potency by masturbation; finally dyspareunia is common when girls still undeveloped sexually are married to powerfully built men.

Regarding the pathological conditions of the female reproductive organs which counteract the peripheral sensory excitants of voluptuous sensation, we exclude from further consideration the obvious causes, absence and atrophy of the reproductive organs, and senile marasmus. Of prime importance as a cause of the failure of sexual sensibility in the early period of married life must be mentioned inflammation of the fossa navicularis, due to awkward attempts at intercourse. Other causes of deficient sensibility are: complete or partial persistence of the hymen, lesions of the vaginal inlet, acute or chronic vulvitis in consequence of irritating abundant secretion, especially as a sequel of gonorrhœal vaginitis. The last named infective disorder is especially harmful, because Bartholin's glands are involved in the associated vulvitis. Even after the cure of the vulvitis, permanent dyspareunia may remain. Perineal fissures may result in the stimulant effect of coitus being insufficient, owing to the slight friction possible at the vaginal inlet in these cases. Not less serious sometimes are small, hardly discernible fissures in the vagina. Additional causes of deficient sexual sensibility are recto-vaginal, and vesico-vaginal fistulæ.

The second cause of dyspareunia, diminution or complete lack of irritability of the reflex centre of the lumbar enlargement of the spinal cord, appears to be less frequently operative. We must, however, assume that certain nervous disorders, such as hysteria and pathological changes in the spinal cord, are

responsible in this connection. The activity of the lumbar sexual centre appears in women to be normally subject to variation within certain limits; and seems usually to attain its maximum irritability during menstruation. But normally these variations are never so great as to produce in women complete though merely temporary dyspareunia; in this respect offering a marked contrast to what occurs in other animals at other times than the rutting season, and of which every bitch not on heat furnishes an example when she refuses the sexual advances of the dog.

As regards the third causal influence in the production of dyspareunia, the influence of the brain, this, though important, is less frequently in operation. Diseases of the brain, degenerative processes, may constitute a cerebral cause for the failure of sexual sensation. But more frequently, certain cortical perceptions, such as dislike or hatred of the cohabiting male, an ardent passion for some other lover, grief and trouble, exercise inhibitory influences, which render the occurrence of voluptuous pleasure during the sexual act difficult or quite impossible.

A condition like dyspareunia, our knowledge of which depends entirely upon the subjective sensations of the woman concerned, is naturally one regarding whose existence accurate information is difficult to obtain. Very rarely does it happen that women spontaneously approach the physician with complaints of this condition; indeed, in my experience, they do so only when they are sterile, and when they assume, in accordance with the widespread popular belief, that their sterility is connected with the absence of voluptuous sensation during sexual intercourse. More commonly, however, it is the husband who feels it his duty to confide to the medical man the remarkable apathy

of his wife in sexual intercourse. But when once the medical man's attention has been directed to this question, and when he institutes inquiries among his patients in a scientific, passionless manner, one making due allowance for a woman's modesty, as the moral importance of the subject demands, he will be astonished at the frequency of dyspareunia, and he will find herein the explanation of many obscure phenomena in the life of woman. On the other hand, it must never be forgotten that a certain number of women complain of dyspareunia without any justification whatever, in order to arouse interest and sympathy, by representing themselves as unwilling sacrifices on the marital altar: the experienced gynecologist will readily detect the cases in which he is being misinformed; he can, moreover, always check the wife's statements by conversation with the husband.

The constant sign of dyspareunia is the failure of ejaculation during coitus. We have previously described the muscular contractions which lead to ejaculation of the secretion of Bartholin's glands and to the expulsion of the uterine and cervical mucus, as reflex actions evoked by the sensory stimulus dependent on friction of the female genital organs. The voluptuous sensation of ejaculation, associated with these muscular contractions, which the woman whose sensibility is normal experiences as the culminating point of her sexual "gratification," is either quite unknown to a woman affected by dyspareunia, or is experienced by her only in a voluptuous dream, as a pollution, in which the sexual dream-perceptions act as the psychical stimuli by which the reflex discharge is originated. It has repeatedly happened to me, that on inquiring of women suffering from dyspareunia regarding their experience of the sensation of ejacula-

tion, I have been informed that such sensations are known to them only from the descriptions of their female friends, or occasionally from dreams from which they have awokened with a feeling of moisture in the external genitals. Von Krafft-Ebing refers this process to a peristaltic contraction of the muscular fibres of the Fallopian tubes and the uterus, "whereby the tubal and uterine mucus is expressed"; whereas, for my part, I am of opinion, that ejaculation affects in the first place and principally the glands of Bartholin, the secretion of which is expressed by the contraction of the constrictor cunnii muscles, and secondarily only affects the cervical glands of the uterus.

As a second sign of dyspareunia, I recognize a remarkably rapid outflow of the male semen from the female genital canal, immediately after coitus (*profluvium seminis*). The woman thus affected complains, when suitably questioned, that she is unable to retain the semen, and that it flows out of the vagina immediately after ejaculation. The cause of this remarkable phenomenon, no doubt, lies in the fact that, owing to the absence of the voluptuous sensation, the reflex contractions of the muscles of the female genital organs, normally accompanying this sensation during intercourse, fail to occur. At the vaginal inlet, in normal conditions, the constrictor cunnii muscle contracts, and farther up in the vagina a peristaltic contraction of the circularly disposed muscular fibres of the tunica media occurs: in this way the semen ejaculated into the vagina is for a time retained under a certain pressure. But in the absence of these muscular contractions, as well as of the muscular contraction of the pelvic floor, retention of the semen fails to occur. Cattle-breeders and horse-breeders have made similar observations regarding cows and mares, namely, that these animals

are sometimes unable to retain the semen after coitus, and it is suggested that in these cases the animals are not properly on heat. Experienced cattle-breeders recommend in such cases that the retention of the semen should be promoted by douching the root of the tail and the external genitals with cold water. It is well known that by stimulating the peripheral sensory nerves in the neighborhood of the genital organs, a reflex excitement of the lumbar sexual nerve centre is produced, as is seen, for example, in the practice of flagellation of the buttocks, for the increase of sexual desire.

Passing to the consideration of the pathological changes to be found in the reproductive organs of women suffering from dyspareunia, the nature of these will for the most part be obvious in relation to the etiology of the disorder. Most frequent, in my experience, were chronic inflammatory states of the vulva and of the vaginal and uterine mucous membrane, chronic metritis and parametritis. A very frequent appearance, and one practically characteristic of dyspareunia when of long standing, is a marked total relaxation of the reproductive apparatus. The uterus is extremely mobile, usually retroverted and partially prolapsed, thin, with lax walls, and usually an enlarged cavity; the portio vaginalis is flaccid, and runs to a point; the vagina is roomy; there is marked hypersecretion of the mucous membrane of the entire genital canal; there is great flaccidity of the constrictor cinni and levator ani muscles, and of the perineum. In several women with dyspareunia, I found old unhealed lacerations of the perineum. In some cases, the very small size of the clitoris is noteworthy. In one case amenorrhœa was present with an infantile uterus. In a large proportion of the cases I was able to detect a

diminution both of the tactile and algic sensibility of the vaginal mucous membrane. The women were for the most part anaemic; many were extremely obese, and of lymphatic constitution. In some cases, however, no pathological changes whatever could be detected in the reproductive apparatus.

Dyspareunia is a condition which affects a woman's whole nature, powerfully influences her mental life, and thus gives rise to greater psychical than physical damage. The consciousness of being deprived of the greatest joy of physical love produces great emotional depression, even in a woman by no means sensually inclined, and gives rise to a hypochondriacal state, at times even to melancholia. In other cases, the idea, not infrequently suggested by more happily situated women friends, that the woman herself is not to blame for this condition, has a demoralizing effect upon her, and destroys the happiness of married life. (It has been confessed to me, in isolated cases, that the dyspareunia was relative only.) Apart from this, the absence of sexual gratification gives rise to a series of nervous troubles, presenting either the variable characters of hysteria, or else the symptoms of neurasthenia. Finally, the frequently repeated incomplete coitus, incomplete inasmuch as the woman does not experience the sensation of ejaculation, induces chronic hyperæmia in the female reproductive organs, passing on into blood stasis, and ultimately into chronic inflammatory tissue changes; in this way arise metritis, perimetritis, and parametritis, salpingitis, oöphoritis, disorders of menstruation, menorrhagia, and atypical uterine haemorrhages. The possibility cannot be disproved, that in this way new-growths of the reproductive organs may also originate. The act of sexual intercourse, which at first may be to the woman a matter

of comparative indifference, and in which she plays her part merely from a sense of duty, becomes, in cases of long-standing dyspareunia, something to which she feels a positive dislike, and is recognized by her as the actual cause of the troubles that ensue upon intercourse, such as sacrache, sensations of weight and pressure in the pelvis, strangury, fluor albus, a feeling of exhaustion, etc.

At times, perverse sexual sensation is associated with dyspareunia. Women who find no enjoyment in normal sexual intercourse with a male, sometimes masturbate, sometimes indulge in *amor lesbicus*, etc.

Of great importance appears to me the relation between dyspareunia and sterility in women. As already pointed out, dyspareunia comes chiefly under medical observation in cases in which it is associated with sterility. The husband, seeking advice concerning his wife's failure to conceive, complains of her frigidity in sexual intercourse as the probable cause; or the wife comes to seek advice, saying that she never experiences sexual gratification, and that for this reason she has failed to become pregnant. As a matter of actual fact, dyspareunia and sterility are associated with such remarkable frequency, that my own experience leads me to believe in the existence of an etiological connection between the two conditions, at least in a certain proportion of the cases. Among 69 sterile women whom I questioned regarding dyspareunia, the latter condition was present in 26, that is to say, in 38 per cent. of the cases. Matthews Duncan reported that of 191 sterile women, 62 did not experience sexual enjoyment. Sexual excitement of the woman during copulation would certainly appear to have a definite bearing upon the occurrence of conception, for we know that by the voluptuous sensation reflex actions are aroused in the

genital canal, favoring the retention of semen and its passage through the os to the interior of the uterus, and perhaps also giving rise to reflex changes in the cervical secretion which favor the passage of the spermatozoa into the uterine cavity.

In cases of relative dyspareunia, the influence of this condition in producing sterility is also manifested, the unfaithful wife being impregnated by her lover though she has remained sterile in intercourse with the husband, to whom she is indifferent. To dyspareunia of this nature (dependent upon sexual disharmony), we may also refer the sterility of a married pair who have for some time lived together in unfruitful intercourse, whereas, after divorce and the contraction of fresh unions, both the man and the woman prove normally fertile. Such cases have been personally known to me; and similar instances aroused the attention of the natural philosophers of antiquity, for instance, that of Aristotle. The importance of voluptuous sensation in promoting conception is also manifest from the fact that in the majority of women, after the pains of defloration, dyspareunia usually persists for a season during the early period of married life; and, corresponding with this, the first conception is usually deferred for some little time after marriage, to a period corresponding with the awakening of the sensation of ejaculation.

FERTILITY IN WOMEN

Fertility in women is the basis of the fecundity of a nation, of its growth, its power, and its importance. It is especially the fertility of married women which enters here into consideration, and forms the source of the statistical data of fertility; these are usually obtained by drawing a ratio between the number of mar-

riages contracted in a given period, and the number of children born in the same period.

The fertility of women is a function beginning at an age varying in dependence on many conditions, and undergoing extinction at a definite period of life. It is, in fact, associated with the duration of the sexual life of woman, and, generally speaking, extends from the sixteenth to the fiftieth year of life. Climate, race, constitution, and morbid conditions, influence alike the first appearance of menstruation and the first pregnancy; and as they influence the duration of menstrual activity, so also do they influence the duration of fertility.

In the Bible are recorded numerous instances of the early commencement of fertility. At the present time, also, in warm climates we meet with many examples of early motherhood.

Moreover, in the records of European countries, we find numerous instances of very early motherhood. Molitor's case, a girl nine years old giving birth to a vesicular mole with an embryo; von Haller's case, pregnancy in the ninth year of life; Carus's case, pregnancy at the age of eight. Caspar saw a girl in Berlin who became pregnant at the age of twelve, and was delivered of a living child. Rüttel saw a girl nine years of age pregnant. King attended the confinement of a girl who at the time of her delivery was not yet eleven years old. Taylor reports the case of a girl twelve years and six months of age who was then in the last month of pregnancy. Koblanck attended a girl of fourteen who was delivered of a child weighing four and a half pounds.

In most of these cases the premature fertility is followed by a premature cessation of fertility. And there is more or less truth in Bruce's statement regarding the

'Arab women in Africa, that those who began to bear children at the age of eleven were seldom still fertile at the age of twenty.

At times we may observe a remarkable extension of fertility beyond the average age, that is, beyond the age of fifty years.

In northern Europe pregnancy at a comparatively advanced age is by no means rare. From the official statistics of Denmark we learn that among 10,000 women, 465 were delivered at ages between 50 and 55 years. In Sweden, of 10,000 mothers, 300 gave birth to children when more than 50 years of age. In Ireland, the proportion of mothers over 50 was 345 per 10,000. In England the official figures dealing with the delivery of 483,613 women, showed that 7,022 were between 45 and 50 years of age, and 167 over 50 years of age.

The ideal of fertility in women is that the first completed act of sexual intercourse should be followed immediately by conception, that the pregnancy should terminate after the normal lapse of time in the birth of a child, and that the same process should be repeated at intervals of about ten months until the end of active sexual life. In actual experience, however, this never occurs. Fertilization as an immediate consequence of the first act of sexual intercourse (which in the lower animals is regarded as the rule) is a very rare occurrence in human beings. Moreover, in no single marriage is the reproductive capacity of the wife utilized to the full, up to the time of extinction of her generative faculty; either because the potency of the male partner undergoes a gradual decline, or, it may be, because, after a while, sexual intercourse becomes less frequent, or because precautions against procreation are taken.

The number of children to which during the three

decades of her sexual life, from the menarche to the menopause, a woman might theoretically give birth, is never actually born. If we assume that, during the period of active sexual life, a woman requires a period of fifteen months to two years for each pregnancy, parturition, and lactation, a woman could easily during this period have fifteen or sixteen children, and this figure would represent the normal product of the normal fertility of the human female. There are, indeed, women who, it may be in consequence of an exceptionally long period of sexual activity, or through giving birth repeatedly to twins or triplets, or because they have married several husbands in succession, have given birth to twenty-four children or even more. In Berlin, in the year 1901, there lived a woman 41 years of age who had had 23 children; there were three women, aged respectively 40, 43, and 46 years, who had had each 21 children; 246 women with families numbering 13 to 20; and 169 women each of whom had given birth to 12 children. In the very great majority of cases, however, the fertility of the wife of the present day is never fully developed. It is modified in various ways by the conditions of marriage, by social circumstances, by considerations relating to the health of husband or wife, by actual illnesses, and by voluntary limitation of fertility. Generally speaking, according to the investigations of Quetelet, Sadler, and Finlayson, the fertility of women is greatest in marriages in which the husband is as old as the wife, or a little older, but without marked difference in age. Marriages contracted at a very early age are less fruitful; the highest fertility is found in marriages contracted when the husband is 23 and the wife 26 years of age.

Conception does not generally take place until sexual

intercourse has been frequently repeated. As the result of a statistical inquiry of my own, relating to 556 fruitful marriages, I ascertained that in these the first delivery occurred.

- Within 10 months after marriage in 156 cases.
- Within 11 to 15 months after marriage in 199 cases.
- Within 16 to 24 months after marriage in 115 cases.
- Within 2 to 3 years after marriage in 60 cases.
- More than 3 years after marriage in 26 cases.

Thus we learn that in 35.5 per cent. of the cases the first delivery occurred within $1\frac{1}{4}$ years after marriage; in 15.6 per cent. within 10 months; and in 19.9 per cent. within 15 months after marriage; and 11.5 per cent. of the cases, the first delivery was more than $1\frac{1}{4}$ years and less than 2 years after marriage; in 6 per cent. it was between 2 and 3 years after marriage; and in 2.6 per cent., the first delivery did not occur until more than 3 years after marriage.

From examination of the birth registers of Edinburgh and Glasgow, Matthews Duncan determined the mean interval between marriage and the birth of a living child to be seventeen months. In the majority of cases, the first delivery does not occur until a complete year has elapsed since marriage; in fact, in nearly two-thirds of the instances the first delivery occurs during the second year of married life.

The interval between two successive births is, according to Matthews Duncan, on the average 18 to 24 months, according to Goehlert, 24 to 26 months; the latter, however, points out that in cases in which the child dies very soon after birth, the birth of the next child ensues on the average in 16 to 18 months. In this connection, we must not fail to take into consideration the influence of lactation, inasmuch as mothers who

do not suckle their children become pregnant considerably earlier, on the average, than those who undertake this duty. In reigning families, for instance, it is by no means uncommon for the consort to be delivered twice within a single year. The degree to which lactation hinders conception is so widely known, that women often suckle their infant for a very long period, with the definite aim of preventing the speedy recurrence of pregnancy. A high official from the Dutch West Indies informed me that for this reason the native women were accustomed to suckle their infants for several years, and that it was by no means uncommon to see a small boy running about smoking a cigar, and then hurrying to his mother in order to be suckled.

The age at which a woman contracts marriage has also to this extent an influence upon her fertility, inasmuch as it appears that those who marry very young are far less fertile than those who marry between the ages of 20 and 25 years; the latter, moreover, have, on the average, a shorter time to wait for their first conception than women who marry before the age of 20. Women who marry after the age of 25 have to wait longer after marriage for their first delivery; in fact, the older the woman after 25, the greater, on the average, the interval between marriage and the first delivery.

The fertility of married women increases steadily up to the age of 35 years, but after this age it begins to decline. What a marked influence the age at marriage has upon fertility is shown by the comparison of the figures relating to married women with those relating to unmarried women; the fertility of unmarried mothers attains its maximum at the ages of 20 to 25 years. In the countries under consideration the average age of women at the time of marriage is 25 to 27 years.

Divergent results as regards the fertility of married women at different ages were obtained by Goehlert from the examination of 5,290 cases from the reigning families of Europe. In the favorable position as regards means of subsistence occupied by the members of these families, marriage naturally occurs, in most cases, much earlier in life, the mean age at marriage being between 19 and 22 years—the youngest mother (in the Capet dynasty) was only 13 years of age—and for this reason the figures relating to the younger age-classes are larger than in the previous tables. But as a result of this, the reproductive capacity also undergoes an earlier extinction, so that of these women, not one gave birth to a child when she was over 50 years of age. Goehlert gives the following table, compiled from these 5,290 instances:

Under 20 years.....	8.8%
From 20 to 25 years.....	25.4%
From 25 to 30 years.....	29.4%
From 30 to 35 years.....	21.6%
From 35 to 40 years.....	11.5%
Over 40 years.....	3.3%

In these cases the maximum fertility was obtained at the age of 27.

The physiological fertility of women is much more clearly manifested when we compare the fertility of women who have been married a few years only, with the fertility of women in the later years of married life. In the earlier period, the effective fertility more nearly approaches the physiological fertility, because at this time the various influences by means of which fertility is later so greatly diminished have not yet come into operation. In this connection the following data, published by Körösi, regarding the percentage fertility

of recently married women, and that of married women in general, will be found of interest:

	Recently Married Women	All Married Women
At ages 20 to 35 years.....	32.0%	20.6%
At ages 35 to 40 years.....	32.7%	14.7%
At ages 40 to 45 years.....	21.4%	5.9%

Inasmuch as we learn from this table that in the case of women aged 40 and upward, the newly-married exhibit a fertility of four times as great as that of married women in general, in whom pregnancy has already become rare, we can infer the influence upon fertility of abstinence and of artificial measures for the prevention of conception.

On the average, the maximum fertility of woman, that is, the maximum of effective fertility, is attained at the age of 18 to 20 years. Extreme youthfulness, and also the opposite condition, too advanced an age, when marriage is entered on, impair a woman's fertility; whereas the conditions most favorable to fertility are that, at the time of marriage, the uterus should have attained its fullest development, and the ovaries also should be completely mature; this is not usually the case at puberty, but rather at the age of 20, 21, or 22 years. In Austria-Hungary, of 100 marriages in which the wife's age at marriage was less than 18 years, the average offspring in the course of a single year were 36 to 38 children; in the case of 100 marriages in which the wife's age at marriage was 18 to 20 years, the average offspring in a year were 40; this being the maximum fertility, the number of offspring in a year per hundred marriages (*i.e.*, the percentage fertility), now undergoes a regular decline as the wife's age at marriage increases; at an age of 25, the percentage fertility is 32; at the age of 30 years, the fer-

tility is 24 per cent.; at the age of 35, 17 per cent.; at the age of 40 years barely 10 per cent.; at the age of 45, 7 per cent.; at ages 45 to 50, 0.1 per cent. Thus, from the last figure, we see that of a thousand women marrying at the age of 50 years, one only gives birth to a child. Men obtain their maximum fertility (*i.e.*, procreative capacity) at the age of 25 or 26 years; at this age their fertility amounts to 35 per cent. (that is, of 100 marriages at this age, 35 children will on the average be born within a single year); at the age of 35 years, the percentage fertility of men falls to 23; at the age of 45 years, it is 9½ per cent.; at 55, 2.2 per cent.; at 65, ½ per cent. (Körösi-Blaschko).

Whereas hitherto we have considered only the monogenous fertility of married women, we must remember that the figures relating to their biogenous fertility are also of interest—that is to say, the changes which a woman's fertility experiences in married life in respect of the peculiarities of her husband; and of these peculiarities, the easiest to make the object of statistical investigation is the husband's age. The age of the husband exercises an important influence upon the fertility of the wife, as is proved by the following figures published by Körösi:

AGE OF THE FATHER	AGE OF THE MOTHER		
	25 Years	30 Years	35 Years
25 to 30 years.....	35.6%	25.0%	21.2%
30 to 35 years.....	31.2%	23.6%	19.9%
35 to 40 years.....	27.5%	21.8%	19.4%
40 to 45 years.....	.....	16.7%	14.0%
45 to 50 years.....	.....	14.4%	10.9%
50 to 55 years.....	.....	.....	10.9%

Also:

AGE OF THE MOTHER	AGE OF THE FATHER			
	25 Years	35 Years	45 Years	55 Years
Under 20 years.....	49.1%	.....	.....	.....
20 to 25 years.....	43.0%	31.3%	16.0%	.....
25 to 30 years.....	30.8%	27.3%	18.5%	.....
30 to 35 years.....	33.5%	23.7%	14.4%	8.1%
35 to 40 years.....	.....	18.9%	11.8%	6.7%
40 to 45 years.....	.....	6.6%	6.1%	3.0%

We learn from these figures that the maximum fertility is exhibited by a woman 18 years of age, when married to a man 25 years of age; less fertile is a woman 25 to 30 years of age married to a man 28 years of age; still less fertile is a woman 35 years of age married to a man 29 years of age. Neither the age of the mother alone, nor that of the father alone, is determinative of the fertility of the marriage, for the fertility of young wives married to elderly husbands is quite different from that of young wives married to young husbands. Very various age-combinations are possible, and each exhibits an average fertility peculiar to itself.

We can also regard the question from the stand-point of the *difference* between the ages of husband and wife respectively. In this connection, Körösi is led by his tables to the conclusion that wives between the ages of 18 and 20 years attain their maximum fertility when married to men 7 years older than themselves; women of 25 years when married to men 3 years older than themselves; women of 29 years when married to men of the same age; women of 30 years and upward attain their maximum fertility only when married to men younger than themselves. Men, on the contrary, always attain their maximum fertility when married to women younger than themselves. The age of maxi-

mum fertility differs in the two sexes, and those marriages will be most fruitful in which husband and wife are each of the age most favorable to fertility. This will be the case when the age of the wife is 18 to 20 years, and that of the husband 24 to 26 or perhaps 29 years.

In connection with the question of fertility, we have also to take into consideration the vitality of the children born, that is, what proportion of those born survive. According to Körösi's interesting papers regarding the fertility of the inhabitants of Buda-Pesth, we learn that for every 100 marriages which have persisted for thirty years and upward, there were born, on the average, 539 children, of whom during this period 241 died, so that the percentage of survivals was 55.28. Parents who have lost one only of several children must, therefore, regard themselves as exceptionally favored by fortune.

Social position, occupation, and religion, have, according to the last-quoted author, a notable influence on fertility. His investigations showed that the Roman Catholics and the Jews exhibited the greatest fertility; among the Catholics there were 541 children, and among the Jews 557 children, per 100 marriages. Amongst 100 Protestant families, on the other hand, only 479 children had been born. It will be seen that the theory of the comparatively enormous fertility of the Jewish race is not supported by these statistics. The Jews do, however, exhibit a greater power of rearing children, for among them the marriages of more than 30 years' duration had 61% per cent. of the children still living; among the Protestants 57 $\frac{3}{4}$ per cent. survived; and among the Catholics only 52% per cent. It thus appears that the surviving offspring per 100 marriages of 30 years' duration were, among the Catho-

lics 278, among the Protestants 252, and among the Jews 349.

The question whether, and to what extent, the age of the parents has an influence on the vitality of the children, is answered by Körösi's mortality statistics in the sense that mothers below 20 years of age give birth to a larger proportion of children deficient in vital power. Where the mothers had married at the age of 16, the mortality of their offspring was, among Catholics 43 per cent., among Jews 33 per cent.; married at 17, Catholic mortality 44 per cent., Jewish 30 per cent.; married at 18, Catholic mortality 42 per cent., Jewish 32 per cent.; married at 19, Catholic mortality 41 per cent., Jewish 29 per cent.; married at 20, Catholic mortality 40 per cent., Jewish 26 per cent. Of the children whose fathers had married at the age of 24, 32 per cent. had died; of those whose fathers had married at 23, 37 per cent. had died; of those whose fathers had married at 20, 42 per cent. had died; and of those whose fathers had married before 20, actually 44 per cent. had died. It thus appears that the children alike of very young mothers and of very young fathers have a lessened chance of survival.

Inasmuch as the fertility of the wife is a product of two factors, her own peculiar fertility, and that of the procreating male, the question of the fertility of women cannot be accurately treated independently of this second consideration; hereby, however, is introduced a multiplicity of obscure combinations, by which the value of all the statistical data of fertility in women is seriously impaired.

These data give as the measure of fertility, the number of children per marriage actually brought up, embracing fruitful marriages, sterile marriages, and those not yet fruitful. In Berlin, in Copenhagen, and

in Buda-Pesth, the average thus attained was slightly less than three births to each family, whilst the number of children actually living averaged two per family. A more accurate representation of fertility is obtained by ascertaining the number of children born, and the number of children living in relation to the duration of marriages reckoned in years, that is, beginning with marriages of one year's duration, and proceeding year by year to the highest recorded duration of marriage. In this way interesting statistics have been obtained; for example, one who has completed thirty years of married life may count on the average that five or six children will have been born to him, but may also reckon on having buried two or three at least of these. (Körösi.)

Fertility is, as many facts indicate, also dependent on nutrition. A distinct proof, says Spencer, writing on the "Coincidence Between High Nutrition and Genesis," that abundant nutriment increases the number of births, and vice versa, is found among the mammalia; compare, for instance, the litter of the dog with that of the wolf and the fox. Whilst the dog's litter numbers 6 to 14, that of the wolf numbers 5 to 7, that of the fox 4 to 6. The wild cat gives birth to 4 or 5 kittens once a year, the domesticated cat to 5 or 6, twice or thrice annually. The most remarkable contrast, in this respect, exists between the wild and the domesticated breeds of swine. The wild sow gives birth once a year to a litter of 4, 8, or 10 pigs (the number increasing in successive litters); the domesticated sow has often as many as 17 in a single litter, whilst in two years five litters, each numbering 10 pigs, are commonly born.

Darwin also draws attention to the fact that animals under domestication, being fed more abundantly and

regularly than their wild allies, procreate at shorter intervals and are markedly more fertile than the latter. He states that the wild rabbit has four litters annually, each numbering 4 to 8 young; whereas the tame rabbit reproduces its kind six to seven times annually, and gives birth to litters numbering 4 to 11. Among birds, analogous phenomena are observed. The wild duck, for instance, lays 5 to 10 eggs in the course of the year, whereas the tame duck lays from 80 to 100; the wild gray goose lays 5 to 8 eggs, the domesticated goose 13 to 18.

It must be added that this exceptional fertility is manifested in animals that are quite inactive in comparison with their wild allies; not only are they richly fed, but they get their food without working for it. Moreover, it is easy to observe that among the domesticated mammals the well-fed are more fertile than the ill-fed.

That in the human species also, fertility is influenced to a notable degree by nutritive conditions, is shown by statistical investigation. After years distinguished by an exceptionally good harvest the number of children born is considerably greater than in normal conditions; whereas after a famine the opposite is observed. Malthus's law of population states, *inter alia*, that the population increases when the amount of available nutriment increases, that is, that favorable nutritive conditions cause an increase, that unfavorable nutritive conditions cause a decrease, of population. Hardships and exhausting occupations diminish the fertility of women. The remarkable fertility of the Kaffirs is referred to the fact that this people, possessing large herds of cattle, lead a life comparatively free from care; it is no less true that the Boer women, who lead a life of well-fed leisure, have very large families; whereas

the Hottentot women, poor, ill-nourished, and hard working, seldom bear more than three children.

Generally speaking, it may be said that fertility of the soil, in connection with an easily gained livelihood, favors also human fertility, notwithstanding the fact that certain statistical data seem to conflict with this proposition. Sadler, for instance, concludes that an increase in the price of the necessities of life does not *per se* check fertility, but, indeed, rather increases it; he considers that the apparent decline in fertility is due to the fact that the number of marriages diminishes, owing to the rise in prices. We must, however, point out, that an increase in price of the necessities of life is often associated with a rise in wages, and is therefore not necessarily identified with deficient nutrition; when, however, such a rise in prices leads to actual want, a limitation of fertility will certainly result; this has been proved by Legoyt and Villermé with regard to failure of the crops. Famine and disease lower the number of births; a less severe deficiency of nutriment often lowers only the quality of those born. Malthus was of opinion that the population of a country at any time was related to the quantity of nutriment produced or imported therein, on the one hand, and, on the other, to the liberality with which this nutriment was distributed to the individual. In countries where corn forms the principal crop, we find a thicker population than in pasture lands; and where rice is the principal crop, the population is even more abundant than it is in corn growing countries.

Passing to the consideration of the individual nutritive elements, we find that these also influence fertility. Above all, it has been proved that alcohol notably diminishes the fertility of women. Lippich states that of 100 women in Kärnten and Krain suffering from

chronic alcoholism, 28.3 were barren. In England, where the abuse of alcoholic beverages is also very frequently observed in women, the same phenomenon has been noted. Matthews Duncan held that alcohol exercised a specific deleterious influence on fertility. Moreover, in addition to the constitutional disturbances produced by the abuse of alcohol, this beverage also exercises a well-known pathogenetic influence upon the female reproductive organs; with especial frequency, chronic oöphoritis may be shown to depend on this exciting cause.

A diet consisting mainly of fish is known to increase the sexual impulse, and is said also to increase fertility. Further, a diet consisting mainly of potatoes or rice is said to favor reproduction; compare, for instance, the fertility of the Hindoos, who abstain entirely from animal food, and of the Chinese, who live chiefly on rice. Davy maintained that the women of races living chiefly on fish were handsomer and more fertile than others: and Montesquieu suggested that there was an association between the abundant population of sea-ports and also of Japan and China, and the large quantity of fish consumed in those places. On the other hand, a diet consisting chiefly of meat is said to have an unfavorable influence in this direction; in support of this view it is pointed out that races living by the chase, and living, therefore, almost entirely on meat, have very small families. This generalization is invalidated by the fact that Englishwomen, who eat far more meat than the women of the Latin races, are nevertheless distinguished by their great fertility.

In his *History of Civilization in England*, Buckle writes: "The population of a country, although influenced by many other conditions, unquestionably rises and falls in proportion as the supply of nutriment is

abundant or the reverse." Herbert Spencer also states that "every increment in the supply of nutriment is followed by an increment in fertility."

It must not be forgotten that, in addition to the more or less abundant supply of nutriment, there are always other influences affecting fertility; the general mode of life, race, climatic conditions, etc., may, in various ways, coöperate with or countervail the influence of nutritive conditions. If, with the best possible supply of nutriment, there is associated a luxurious and enervating mode of life, the abuse of alcohol, severe intellectual exertion, or sexual excesses, the general result will be a diminution in fertility. And it is easy to understand why Cros, although perhaps with little justification, goes so far as to regard easy circumstances as an active cause of depopulation. "It is the poor," he writes, "and the less wealthy departments of France, in which we find the most children." In estimating fertility, however, we must never fail to take into consideration the more extensive employment of means for the prevention of pregnancy among the upper classes of society.

To a certain extent we can trace the influence of climate and of season upon fertility. Heat appears to favor fertility; Haycraft's figures for the eight largest towns of Scotland show clearly how the number of conceptions rises and falls *pari passu* with the temperature. Lower animals also, when brought from a colder to a warmer neighborhood, exhibit an earlier and more frequently recurring "heat." In Europe, however, the Northern races appear more fertile than those of the south.

Of the seasons, spring is the one especially favorable to fertility. Quetelet, who proves by numerous statistical data that the maximum of conceptions occurs

in May, attributes this fact to a general increase in the vital forces occurring in spring, after the cold of winter. Villermé, however, goes back to the older explanation, that the increase in the number of conceptions in May and June is due to social and economic conditions. The return of spring, especially the end of spring and the beginning of summer, a time of year in which the means of subsistence are provided in exceptional quantity, and of especially good quality, the season also of festivals and social reunion, when the two sexes are brought into more intimate contact and when the majority of marriages occur—these are the conditions associated with the season of greatest fertility. The figures of Wappaeus also confirm the influence of spring in favoring fertility. He found, however, that there were two seasons of maximal fertility. The first at the end of spring and the beginning of summer; the second in winter, especially in December. Mid-winter is for most people a period of domestic amusement and relaxation, one of exceptionally good nutrition, and of social reunion; the spring increase in fertility is a part of the awakening and increase of the reproductive forces of nature at large, which recurs every spring-time.

Every marked and sudden change in the mode of life has an unfavorable influence on fertility. . Darwin reports that mares who have for some time been stall-fed with dry fodder and are then put out to grass are at first infertile after the change. Europeans going to reside in the tropics experience a notable decline in fertility as a result of the change of climate. According to Virchow, the fertility of European women who become acclimatized in the tropics declines very gradually, but in the course of a few generations is almost completely annulled.

The marriage of near kin is believed also to diminish fertility. As regards inbreeding in the lower animals, it is well known that when nearly related animals copulate, the number of the offspring is below the average. Nathusius paired a sow with its own uncle, the boar having proved productive in intercourse with other sows; the litter numbered five to six only. This sow, which belonged to the great Yorkshire race, was then paired with a small black boar, which in intercourse with sows of its own variety had procreated litters numbering six or seven; as a result of her first pairing with the black boar, the sow cast a litter numbering twenty-one, whilst the second attempt produced a litter of eighteen. Similar results were obtained by Crampe, in his experiments in the inbreeding of rats.

Some authorities declare that the results of inbreeding are similar in the human species, that the marriages of near kin are less fruitful than the average. Darwin writes in this connection: "With regard to human beings, the question whether breeding in-and-in is also deleterious, will probably never receive a direct answer, for man reproduces his kind so very slowly, and cannot be made the object of experiment. The very general disinclination of nearly all races to the marriage of near kin, which has existed from the very earliest times, is of weight in relation to this question. Indeed, we appear almost justified in applying to the human race the experience gained by experiment on the higher mammals."

Darwin's assumption regarding the effect upon fertility of the marriage of near kin in the human species, cannot, however, be accepted without qualification. In ancient times there was no uniformity of opinion on this topic. It is well known that among the Phœnicians, a son might marry his mother, and a father his

daughter; and among the ancient Arabs it was the legal duty of the son to marry his widowed mother. Moses, on the contrary, forbade marriages between parents and children, between brothers and sisters, also marriage with a father's sister, with a wife's mother, and with an uncle's widow.

Darwin considered that the marriage of first cousins was not unfavorable to fertility. Of 97 such marriages, 14 were sterile, whilst of 217 marriages of those not akin, 35 were sterile; the percentage in both cases being almost identical. Mantegazza, who regards kinship in marriage as unfavorable to fertility, found, nevertheless, that among 512 marriages of near kin, only 8 to 9 per cent. were sterile. It is widely believed that the dying out of many aristocratic families is dependent on the inbreeding so common in this class—but it must be admitted that scientific evidence in support of this belief is lacking. Incest in the human species may certainly result in fertilization. Among the Jews, marriages of near kin are very common, and often prove extremely fruitful.

Göhlert made a statistical investigation of the fertility of the reigning families of Europe, in order to throw light on this question. In the Capet dynasty, 118 marriages of near kin took place, and of these 41 were sterile; in the Wettin dynasty (Saxony), there were 28 such marriages, of which 7 were sterile, and 1 produced one child only; in the Wittelsbach dynasty (Bavaria), 29 such marriages, of which 9 were sterile, and 3 produced only one child each. Thus of 175 marriages of near kin, 57, or 32.6 per cent. remained sterile. Further, in the Hapsburg-Lothringen dynasty, of 110 marriages, 25 were marriages of near kin, and of these 33 per cent. remained sterile.

It has been assumed since the days of antiquity that

temperament and constitution exercise some influence on fertility. Hippocrates, Soranus, and Diokles, are among the ancient authors who refer to this matter. Soranus says very justly: "Since most marriages are contracted, not from love, but for the procreation of children, it is irrational, when choosing a wife, to have regard, not to her probable fruitfulness, but instead of this to the social position and the wealth of her parents."

It would appear that a certain dissimilarity in physical constitution and temperament between husband and wife is favorable to the fertility of the marriage. For instance, a vivacious, dark husband, and a lethargic, fair wife, are better suited to one another than a husband and wife both extremely active, or both of extremely phlegmatic temperament.

Toussaint Loua published the following figures regarding the fertility of the women of the various countries of Europe:

COUNTRY.	Number of births per hundred inhabitants.	FERTILITY OF WOMEN BETWEEN THE AGES OF 15 AND 45 YEARS.		
		Married	Unmarried	Average
Hungary	4.94	....	....	17.8
Russia	4.12	....	....	20.5
Austria	3.93	....	....	16.4
Germany	3.77	34.8	2.9	17.7
Italy	3.67	28.8	2.4	16.1
Holland	3.67	35.3	1.0	16.0
Finland	3.63	....	....	15.8
England	3.58	29.7	1.6	15.5
Scotland	3.53	32.8	2.5	15.8
Belgium	3.25	33.7	1.8	14.8
Denmark	3.12	28.5	2.8	14.4
Roumania	3.12	....	....	13.5
Norway	3.10	29.3	2.2	14.0
Sweden	3.05	29.1	2.5	13.7
Switzerland	3.04	29.7	1.1	13.1
Greece	2.96	....	....	13.2
Ireland	2.69	29.8	0.5	12.3
France	2.63	20.3	1.8	11.6

In towns, conjugal fertility is less, extra-conjugal fertility greater, than in the country. An increase in factory-labor gives rise to an increase in the population, but to a decline in the vitality of the offspring; that is to say, it causes a quantitative increase, and a qualitative decrease, in fertility. An increase in agricultural labor has precisely the opposite effect. The influence of war upon fertility is unfavorable both quantitatively, and qualitatively. According to Tschou-riloff, the introduction of universal military service, by withdrawing for a time all the most vigorous men from domestic life, tends to diminish fertility. Extensive emigration from a country in which the soil is fertile, and where the vital conditions are generally favorable, is stated by Bertillon to cause an increased fertility in the mother country; he further states that an increase in the number of the proprietors of the soil is followed by diminished fertility, and vice versa.

Conjugal fertility, that is to say, the ratio between legitimate births and the number of married women between the ages of 15 and 50 years, has declined in Germany during the last decades. It was:

During the years 1872 to 1875.....	29.7%
During the years 1879 to 1882.....	27.4%
During the years 1880 to 1892.....	26.5%

This decline is small, but it is much more manifest in urban than in rural districts. This fact is shown by the following figures, relating to fertility in Prussia:

1872 to 1879. 1894 to 1897.

In all towns.....	26.9	24.0
In Berlin.....	23.8	16.9
In other large towns.....	26.7	23.5
In rural districts.....	28.8	29.0

This difference depends principally on the fact that in the large towns of Germany (and still more in those

of France) the use of means for the prevention of pregnancy is continually increasing, whereas the population of the rural districts is as yet less familiar with the use of these measures.

According to Hellstenius, conjugal fertility, that is, the number of children per married couple, is as follows:

In the Netherlands	4.88
Norway	4.70
Prussia	4.60
Bavaria	4.55
Sweden	4.52
Saxony	4.35
England	4.33
Belgium	4.23
Denmark	4.18
France	3.46

Tallquist, who has published a statistical investigation concerning the modern tendency to diminished fertility, arrives at lower figures than Hellstenius. According to him, conjugal fertility is:

In Prussia	4.11
England	4.10
Belgium	4.12
France	2.09
In various States of the American Union.....	2.5 to 3.0

From the Almanach de Gotha Vacher obtained figures showing that each family of the higher aristocracy has on the average the following number of children:

In France	2.0
Italy	3.0
Germany	4.8
England	4.9
Russia	5.1

'According to the figures we have published, the fertility of women suffices for the production during the sexual life of a small number only of children, averag-

ing, in fact, 4 to 5 children per marriage. Many mothers, however, give birth to a very large number of children. Among 73,000 families inhabiting Buda-Pesth, Körösi found 300 mothers who had had 15 children or more; 7 mothers who had each had 21 children; and 3 mothers who had given birth respectively to 22, 23 and 24 children.

A newspaper report states that the wife of a citizen of Buda-Pesth, during the 43 years of her married life, gave birth to 32 children. In the year 1902, a Bohemian woman gave birth to her twenty-fourth child. Stieda reports the cases of two mothers, one of whom had 21, and the other 23 children. The wife of the German Emperor, Albrecht I., and the wife of Prince Jost of Lippe-Biesterfeld, each bore 21 children.

The so-called *two-children-system* obtains most commonly in France.

It is true that even in France there are on an average nearly three children born per marriage; but if we take into account surviving children only we find an average per family of 2.1 children only. Similar conditions obtain in New England, and in Transylvania; and the same practice is spreading throughout the United States. Another way in which the attempt is made to keep down the population is that customary in Alsace, where, if there are several children in a family one only marries, in order to avoid a division of the family property. It cannot be denied that in France, doubtless in consequence of the two-children system, a somewhat widely diffused prosperity exists, a prosperity which is lacking in the rare districts in France, such as Brittany, in which limitation of the family is not practised. What a disastrous influence the general use of measures for the prevention of pregnancy exercises on the military power and political

status of a nation has, however, in recent years been made especially manifest in the case of France. In that country, of ten million families, two million are absolutely childless, and two million have only one child each, so that two-fifths of the French families are as good as inactive in maintaining the population of the country. The injury thus done to France is shown still more clearly by a tabular comparison of the excess of births over deaths in the German and French nations, respectively, during the two decades 1874 to 1894 (from G. von Mayr's Population Statistics).

Year	Germany.	France.
1874.....	+13.4	+4.8
1875.....	13.0	2.9
1876.....	14.6	3.6
1877.....	13.6	3.9
1878.....	12.7	2.6
1879.....	13.3	2.5
1880.....	11.6	1.7
1881.....	11.5	2.9
1882.....	11.5	2.6
1883.....	11.7	2.6
1884.....	11.2	2.3
1885.....	11.3	1.4
1886.....	10.8	1.5
1887.....	12.7	1.3
1888.....	12.9	2.5
1889.....	12.7	1.2
1890.....	11.3	-0.3
1891.....	13.6	-0.5
1892.....	11.7	+0.1
1893.....	12.2	-1.2
1894.....	13.6	-0.4

To what an extent in all times, and among all peoples, the fertility of women was esteemed, is shown by religious writings and traditional customs which aimed at enabling a wife who had had no children by her own husband, to seek other conjugal embraces. Among the Jews, it was the duty of a man to marry his widowed

and childless sister-in-law; if he were unwilling or unable to perform this duty he was compelled to take a part in a ritual termed "chaliza," in which his foot was bared and the bereaved woman spat upon him, because he was unwilling to maintain his brother's house. In the law book of the Hindoos of Manus, we read, "If husband and wife have no children, it is proper for them to obtain the desired offspring by a union between the wife and the husband's brother, or some other relative." The child obtained in this way was legally regarded as the child of the husband. Confucius wrote: "If your wife is barren, take a second wife; she must be subordinate to the first wife, for her only duty is the bearing of children." An analogy to this ordinance is to be found in the Bible; Abraham's barren wife Sarai says to Abraham: "Behold now, the Lord hath restrained me from bearing: I pray thee, go in unto my maid; it may be that I may obtain children by her. And Abraham hearkened to the voice of Sarai." In the same way the barren Rachel speaks to her husband Jacob, "Behold my maid Billah, go in unto her; and she shall bear upon my knees, that I may also have children by her."

Luther, in his treatise on marital love published in the year 1522, bases, doubtless on the above biblical precedents, the following statement regarding fertility: "If a sexually potent woman is married to an impotent man, if she is unable to take any other man openly, yet is unwilling to do anything dishonorable, she should say to her husband, 'Dear husband, you cannot fulfil your duty to me, and you have deceived my young body, you have endangered my honor and my happiness, and in the eye of God our marriage is null, forgive me, therefore, if I form a secret union with your brother or with your nearest friend; the fruit of this union

will be yours in name, thus your possessions will not fall to strangers, and you will willingly allow me to deceive you, because involuntarily you have deceived me."

In ethnography, the term *endogamy* is used to denote a law or custom by which marriage is allowed only within the limits of a specified race, tribe, or caste; thus, in the Old Testament, Jews are forbidden to marry women of other races. The ethnographical term *exogamy* indicates the prohibition of marriage between persons who are more closely allied, as, for instance, the Mosaic prohibition of marriage within certain degrees of blood-relationship. Such exogamic prohibitions persist even in the legislation of the present day. In many ecclesiastical and national laws we find the marriage of first cousins and of uncle or aunt with niece or nephew forbidden; and even a prohibition of the marriage of a man with his deceased wife's sister.

Hegar considers the danger of inbreeding to be very great in the human species; for whereas in the lower animals breeders employ a methodical and carefully considered selection of the best specimens, nothing of this kind occurs among human beings; and the health of modern civilized man is such that there are few families without a skeleton in the closet. "Not only in families, but also in villages, in small and large towns, even in classes, and in entire nations, certain peculiar qualities, morbid tendencies, and predispositions, are handed down from generation to generation. We have, for instance, the tendency of the Jews to nervous disorders and diabetes, that of the English to gout, that of the Germans to myopia." Strahan has, therefore, employed the term "social consanguinity," to indicate that by means of common customs, environment, occupation, and mode of nutrition, a similarity in

type is produced, leading to a similar predisposition to disorders and diseases transmissible from father to son.

The dangers of inbreeding are believed by Hegar to be, under present-day conditions, so considerable that he would allow the marriage of near kin in exceptional cases only, and where the circumstances are peculiarly favorable—for instance, where both parties to the projected marriage are in excellent health, and where there is no great similarity between them in feature or mental type. Certain anomalies transmitted from remote ancestors, dependent on deeply-marked peculiarities of the germ cells, may be so developed by inbreeding as to become absolutely fixed characteristics. If the morbid manifestations can be traced back for several generations, if the bodily defects and disturbances of development (the so-called stigmata of degeneration), are well marked and numerous, if the functional disorders of the nervous system and of the sense organs are pronounced, leading to idiocy, insanity, epilepsy, congenital deafmutism, blindness, instinctive criminality,—there is in such cases little or no hope of the regeneration of the family. It dies out, because the members are sterile; because they are confined in prisons or asylums; or because the children, if any are born, are deficient in vitality, and fail to reach maturity.

According to the brief summary of the subject given by Hegar, the peculiarities of the offspring at the time of birth depend upon:

Factors which give rise to peculiarities of the germ-cells:

- I. Germinal rudiments derived from the ancestors;
- II. Influences acting on the germ-cells within the parent organism;

- a. Owing to peculiarities of the fluids and tissues of the parental body;
- b. Owing to substances which penetrate the parental body and reach the germ.

Germinal rudiments altered by the conjugation of the male and female reproductive cells:

- I. On the mother's side;
 - a. Owing to peculiarities of the fluids and tissues of the maternal body;
 - b. Owing to substances which penetrate the maternal organism and reach the fertilized ovum.
- II. On the father's side, owing to substances which adhere to the paternal reproductive cells, or are enclosed within these.

The number of consanguineous marriages at the present day is not less than $5\frac{1}{2}$ to $6\frac{1}{2}$ per 1,000; the fertility of these marriages appears to be identical with the fertility of ordinary marriages. Mayet has made a statistical investigation to determine the influence of consanguineous marriages in the pathogenesis of mental disease. He finds that the number of those congenitally affected with mental disorder is twice as great in the offspring of consanguineous marriages as in the offspring of crossed marriages; in the case of simple mental disorder, of paralytic dementia, and of epileptic dementia, the ratio is actually greater than two to one (the actual figures are 218, 257, 208 : 100). Thus we see that when there exists any cause of inheritable mental disorder, blood-relationship of the parents more than doubles the danger to the children. In the case of imbecility and idiocy the danger is less in this respect (the ratio is 150 : 100); the factor of inheritance plays a less prominent part than in the case of other psychoses.

It was remarkable that among the offspring of mar-

riages of nephew and aunt, cases of mental disorder were almost entirely lacking. Among the offspring of marriages of uncle and niece, the inheritance of mental disorder was more prominent than among the children of first cousins. It is interesting to determine the influence of blood-relationship in cases in which the existence of inheritable predisposition could not be proved. In these cases, as regards simple insanity, paralytic dementia, and epileptic dementia, the number of cases among the offspring of consanguineous marriages was only one-half as compared with the offspring of crossed marriages; whereas in the case of imbecility and idiocy this ratio was reversed. In idiocy, where inheritance, generally speaking, plays a small part, the origination of the disease would often appear to depend directly on the blood-relationship of the parents; whilst as regards other forms of mental disorder, if there is no inheritable predisposition, blood relationship in the parents appears to be a positive advantage; where, however, a family predisposition to insanity exists the likelihood of actual insanity appearing in the offspring is notably enhanced by a consanguineous marriage.

The Restriction of Fertility and the Use of Means for the Prevention of Pregnancy

As we have already pointed out, a restriction of the fertility of women occurs in the majority of marriages, to this extent, that the potential reproductive powers of the wife are not fully utilized. In recent times, however, the restriction of fertility, by the deliberate use of measures for the prevention of pregnancy, has become so widely diffused, that it appears unwise from the scientific standpoint simply to ignore the question, and it has become indispensable to study how the practice developed, and to consider what are its actual

results. From our own point of view, it is the more necessary to do this, for the reason that the use of preventive measures has come to play an important part in the sexual life of woman, and therefore deserves the fullest attention, not merely from the standpoint of the sociologist, but in addition from the purely medical point of view.

In many divisions of the population, and even in entire nationalities, the prevention of pregnancy, not merely in illicit intercourse, but also in married life, has become so general a practice that the fertility of the nation as a whole has been profoundly modified. Thus, in France at the present day, the average number of children per marriage is less than two; and the two-children-system is almost universally practised in Transylvania and Norway, whilst it is very rapidly spreading in North America. In the principal towns of the whole of Europe, this system is largely on the increase among the upper classes of society. The marriages of the poor, partly owing to ignorance and partly to indolence, are as yet comparatively little affected by this depopulative principle.

In the days of antiquity, many lawgivers endeavored to set bounds to excessive fertility, and artificial abortion was methodically practised by those who wished to avoid an inconveniently large family. Even among savage peoples, we find that certain preventive measures are occasionally employed in sexual intercourse. Among civilized peoples, however, until the beginning of the nineteenth century, religious and moral ideas derived from the Bible continued to dominate the sexual life. It is well known that Old Testament law and Christian morality alike forbid any artificial restriction of human increase. "Increase and multiply" was the command given in Genesis to the first parents

of the race; and the psalmist exclaims, "Happy is the man that hath his quiver full". of children.

A remarkable revolution in thought was initiated toward the beginning of the nineteenth century by the great philanthropist and powerful thinker, Thomas Robert Malthus, founder of the doctrine of the propriety of checking the increase of population, author of the work "*An Essay on the Principle of Population,*" London, 1798, whose Law of Population soon attracted world-wide attention. Modern civilization having greatly increased the cost of bringing up a family, while simultaneously there has been a general rise in the price of the necessities of life, there has resulted an extraordinary diffusion of Malthusianism; in comparison with the causes just alluded to for the use of preventive measures, diseases which render renewal of pregnancy dangerous to the mother's life have comparatively little to do with the causation of voluntary sterility.

In his *Essay on the Principle of Population*, Malthus indicates, as the cause which has hitherto hindered mankind in the pursuit of happiness, the unceasing tendency of all organic life to increase in excess of the means of subsistence. In the case of plants and of unreasoning animals, the natural process is a very simple one. Both animals and plants are impelled by a powerful instinct to reproduce their kind, and the operation of this instinct is quite undisturbed by any anxiety regarding the livelihood of their offspring. The reproductive function is thus exercised at every available opportunity, and the superfluous individuals of the next generation are destroyed by lack of space and nutriment. In the human species the restriction of population is effected by a more complex mode of operation. Man is impelled to reproduce his kind by an instinct not less powerful than that of other

animals; but the gratification of this instinct is checked by reason, which makes him ask himself whether he is not about to bring into the world beings for whom he will be unable to provide the means of subsistence. If he is influenced by this consideration, the resulting restriction of population may often entail serious consequences; if, on the other hand, he gratifies his instinct, regardless of the appeal of reason, the human species will inevitably tend to increase more rapidly than the means of subsistence.

Malthus declared that population, when its increase was unrestricted, doubled itself every twenty-five years, and therefore increased in a geometrical progression; he considered that in the most favorable circumstances the means of subsistence could not possibly increase more rapidly than in an arithmetical progression. The contrast between these two modes of increase will be more striking if we write out the actual figures. According to the theory of Malthus, the increase of human population would be represented by the figures 1, 2, 4, 8, 16, 32, 64, 128, 256, whereas the simultaneous increase in the means of subsistence would be represented by the figures 1, 2, 3, 4, 5, 6, 7, 8, 9. Such an increase in population is, however, always prevented by certain checks, classed by Malthus as of two kinds, preventive checks and positive checks.

A preventive check, in so far as it is voluntary, is peculiar to the human species, and originates in the intellectual faculty which enables man to foresee the consequences of his actions. A man who looks around him, and sees the poverty into which those with large families so often fall, who reckons up his present property or earnings, which barely suffice to provide for his own personal necessities, cannot fail, when he considers how hardly they would suffice for seven or eight

additional persons, to doubt whether it would be possible for him to provide for the offspring he might bring into the world. Such considerations as these are likely to lead a large number of persons of all civilized nations to resist their natural instincts, and to refrain from early marriage. If abstinence entailed no serious consequences, it would be the least of all evils resulting from the principle of population.

The positive checks to increase of population are manifold, and embrace all the causes which are competent to lessen the natural duration of human life. Among these we may enumerate: all unhealthy occupations, severe toil, climatic conditions, poverty, errors in the rearing of children, town life, excesses of all kinds, the whole army of illnesses and epidemics, war, pestilence, and famine. In all countries, preventive and positive checks are more or less powerfully operative, and yet there are few in which the population is not continually tending to increase beyond the means of subsistence. As a further consequence of this tendency of population to increase, we observe the wider diffusion of poverty among the lower classes, so that any permanent improvement in their condition is rendered impossible.

After Malthus had carefully stated his thesis, he gave a summary record of the conditions of population in nearly all nations of the past and of his own time, in order to show how in all alike the three principal means of limiting population, moral restraint, disease and poverty, had been in continuous operation.

He showed, for instance, how the population of the South Sea Islands had been limited by certain conditions, cannibalism, castration of the males, infibulation of the females, late marriages, the sanctification of virginity, contempt for marriage, etc.

In ancient Greece, Solon's laws permitted infanticide. Plato, in "The Republic," asserts that it is the duty of the Government to regulate the number of the citizens, and to prevent an immoderate increase; men and women should be allowed to procreate only during their period of maximum strength, all weakly children should be killed. Aristotle advised that men should not be allowed to marry before the age of 37, and women before the age of 18; the women should give birth to a limited number of children only; if, after this, they again became pregnant, abortion should be induced. He maintained that if all were at liberty, as was the case in most countries, to bring into the world as many children as they pleased, poverty, the mother of crime and insurrection, must inevitably ensue.

Among the Romans war was as a positive check unceasingly operative: in this time of the Empire, preventive methods came into general use, in the form of various kinds of sexual perversity. Juvenal complains of the skilled methods employed in the induction of abortion; during the later period of the Roman Empire, sexual morality became so degenerate that marriage was hated and despised.

Passing to the consideration of the checks on population among the nations of modern Europe, Malthus examined the registers of marriages and deaths, and came to the conclusion that in few countries is the mass of people sufficiently capable of self-restraint to postpone marriage until they are reasonably assured of being able to provide for all the children they are likely to have; still, he ascertained that at the present day positive checks on population were less active, and preventive checks more active, than in earlier times and among savage races.

Malthus did not base upon his conclusions the advice

that in sexual intercourse means of preventing pregnancy should be employed, as the modern "Malthusians" advise; in his eyes, moral restraint, that is to say, sexual abstinence, was the only remedy for the prevention of poverty and the other evil consequences of the principle of population. Moral restraint was, in his opinion, the only virtuous method of avoiding the evils of excessive fertility. It is a man's duty not to marry until he had a definite prospect of being able to maintain his children; the interval between puberty and marriage must be passed in strict chastity. Man's duty is not the mere reproduction of his species, but the reproduction of virtue and happiness, and if he is not able to do the latter, he has no right whatever to do the former. Malthus lays great stress on educating the people in this matter; "in addition to the ordinary subjects of instruction, it is necessary to explain the principle of population, and the manner in which it gives rise to poverty." In the nature of the case, no lasting and general improvement in the condition of the poor is possible without an increase in the preventive restriction of population.

The Malthusian doctrine of the law of population gave rise to an enormous sensation, and some of his disciples soon proceeded to translate his conclusions into practice; such authorities as James Mill and Francis Place recommended measures by means of which, "without any injury to health, or to the feminine sense of delicacy, conception can be prevented;" the avowed aim of these measures was to prevent the increase of population beyond the means of subsistence. Physicians and physiologists joined the ranks of these innovators; among others Raciborski, Robert Dale Owen in his *Moral Physiology*, Richard Carlile in his *Book of Woman*, the first work to give an exact de-

scription of the means to employ for the prevention of conception, Knowlton in his *Fruits of Philosophy*. In the year 1827 in the northern counties of England leaflets were for the first time distributed among the working classes to instruct them in the use of preventive measures. Bradlaugh founded the Malthusian Society, which aimed at the dissemination of instruction in the use of preventive methods. There is now in England a "Malthusian League," numbering leading physicians among its members; this supplies to all classes the means by which the family can be artificially limited. A new edition of the above-mentioned book, *The Fruits of Philosophy*, was circulated in London in an edition of several hundred thousand copies, and prominent persons spoke at congresses on the subject of Neo-Malthusianism. In Germany, also, a "Union of Social Harmony" was founded, for the free distribution of a hand-book on the use of measures for the prevention of conception, and for an investigation regarding the results of these.

We do not propose here to subject the teaching of Malthus to a critical examination; he has found formidable opponents, who have endeavored to prove that his fundamental assumption is false; they maintain that work or the power of work increases in direct ratio with the population; and they also assert that population tends to increase, not, as Malthus maintained, in a geometrical, but simply in an arithmetical progression. We shall merely quote Liebig's reply to the law of Malthus, "when human labor and manure are provided in sufficient quantity, the soil is inexhaustible, and will continue to yield unceasingly, the most abundant harvests"; and Rodbertus' remark that "agricultural chemistry will ultimately be competent to create nutritive materials; this will some day be just

as much within the power of society, as it is at present to provide any requisite quantity of textiles, given the necessary amount of raw material." The celebrated socialist Bebel, is a strong opponent of Malthus. He writes: "The earth is doubtless thickly populated, but none the less only a small fraction of its surface is occupied and utilized. Not merely could Great Britain produce, as has been proved, a far larger supply of nutritive materials than at present, but the same is true of France, Germany and Austria, and in a still higher degree of the other countries of Europe. European Russia, were it as thickly populated as Germany, could support, instead of ninety millions, as at present, a population of four hundred and seventy-five millions. For the purposes of the higher civilization, toward which we are striving, we have to-day in Europe, and shall have for a long time to come, not an excess of population, but an insufficiency, and every day brings new discoveries and inventions whereby the means of subsistence are potentially increased. In other parts of the world, the insufficiency of population and the superfluity of ground are even more noticeable.

Carey is of opinion that the single valley of the Orinoco, fifteen hundred miles in length, would suffice to provide nutritive material in sufficient quantities to feed the whole existing population of the world. Central and South America, and more especially Brazil, have a soil of extraordinary fertility, but are as yet practically unutilized by the world. To increase, not to diminish, the numbers of the human race, that is the appeal made by civilization to mankind!" A similar position on this question was recently taken by Roosevelt, ex-President of the United States, himself the father of six children, in a letter to two American women, Mrs. J. and M. Van Vorst, authors of the

book *Woman Who Toils (Factory Life in America)*). In this book, the writers prove that in the United States the average size of the family is now less than in any other country of the world, France alone excepted.

Roosevelt, in his letter, declared himself an ardent supporter of the biblical injunction, "increase and multiply!" He writes: "Whoever evades his responsibilities, through desire for independence, convenience, and luxury, commits a crime against the race to which he belongs, and should be an object of contempt and horror to a healthy nation. When men avoid becoming fathers of families, and when women cease to regard motherhood as the most important career open to them, the nation to which these men and women belong has cause for uneasiness about its future. To the American woman marriage is no longer a life-duty, a profession, as it is to her sisters who are members of the older civilizations. A woman who manages an extensive business, who supervises her own landed property, or who plays her own part in the world of finance,—for such as these, the 'lottery of marriage' is naturally something they dread rather than desire."

Eliot, ex-President of Harvard University, has expressed similar views in a speech on this subject. He deplores the late marriages and small families of the cultured Americans. According to the last census, an American family has on the average less than three children; twenty years ago the average number was from four to five children.

I pass now to consider the medical point of view of this question of the prevention of pregnancy. It is my opinion that the physician as such should intervene in the matter, not in any case for the relief of the dominant economic parental dread of insufficient means

for the upbringing of children, but only on account of the purely medical consideration of the physical dangers of motherhood. That is to say, the physician should lend his skilled assistance toward the attainment of facultative sterility, only when his own special scientific knowledge leads him to consider this urgently necessary; it is not his province to assist in preventing the birth of an immoderate number of offspring; his intervention is justified only when deliberate reflection has convinced him that his patient's health or life would be endangered by pregnancy or child-birth. A woman's life and well-being must appear to him of greater importance than the existence or non-existence of a possible infant. That this view is morally sound, is shown by the fact that public opinion justifies the accoucheur in the destruction of an already living child, when the mother's life is endangered. In this connection we may recall the words of the great Napoleon: The physician Dubois, attending Marie Louise in a difficult confinement, asked Napoleon whether, if matters came to an extremity, he should save the mother or the child; Napoleon, notwithstanding his strong desire for the birth of an heir to his dynasty, replied, "The mother, it is her right."

In isolated cases, which deserve always very serious consideration, some pathological condition in the wife may justify the prevention of pregnancy. In certain very serious general disorders, in diseases of the heart or of the lungs, in pelvic deformity, and in pathological changes of the female reproductive organs, it may be right to employ means for the prevention of pregnancy—not merely sexual abstinence, but actual measures to prevent fertilization.

The misuse of medical knowledge for the recommendation or employment of preventive measures, on

the ground of humanitarian sentiment or social and economic considerations, must, however, be strongly resisted. Even leading gynecologists have erred in this way. Sänger writes, "Scientifically-trained accoucheurs will do much more to promote the health and well-being of women, and to protect them from sexual and other diseases, than the humanitarian efforts of the Neo-Malthusians, who transfer a purely scientific question, such as the disproportion between the number of births and the supply of nutritive material, to the sphere of medicine, regarding themselves as justified in preventing conception whenever they please, independently of considerations relating to the health of the mother.

* * * * * * * A woman exhausted by frequent child-bearing, anæmic and suffering, is certainly a figure to arouse everyone's sympathy; in so far as she is ill in consequence of injury received in childbirth, it is our duty to prevent further injury, and to relieve to the best of our ability that which has already occurred; in so far, however, as she is not suffering from any affection of the reproductive organs, but is ill owing to the lack of sufficient food, or from overwork, it is the duty of society to render assistance. Here we have to do with the social problem; the solution of which will be brought no nearer by the use of the occlusive pessary." Fehling also maintained that a text-book of gynecology is not the proper place in which to pass judgment on so important a socio-political question. The business of the gynecologist in this matter is merely to say a word of caution against the use of various measures which are so often recommended as harmless, but are in fact dangerous to the woman who uses them.

Kleinwächter, who declares that he is far from recommending the use of preventive measures when a healthy woman wishes to save herself the trouble of

child-bearing, gives as legitimate indications for their use: 1, the various forms of severe pelvic deformity; 2, certain tumors in the pelvic cavity; 3, after the removal of malignant tumors of the reproductive organs, certain general disorders, recently arrested pulmonary tuberculosis, organic heart disease, etc. Regarding these cases, Kleinwächter writes: "The wife's life would be endangered by pregnancy, which must therefore be prevented without forbidding coitus, and avoiding the practice of coitus interruptus, which endangers her health, or of any mode of intercourse repugnant to the feelings of wife or husband."

The most trustworthy, but unquestionably at the same time the least practicable method, for the prevention of pregnancy, is that of Malthus—permanent sexual continence. This recommendation, to which Tolstoi in *The Kreutzer Sonata* gives his adhesion, has recently found an advocate in a modified sense in a distinguished gynecologist, Hegar, who considers that the great fertility of the modern civilized countries of Europe entails many disadvantages—inferior physical development, increased general mortality, emigration, an unfavorable distribution of population in relation to dwelling and occupation, occasional famine—and who sees the only effective remedy in a "regulation of reproduction," whereby the tendency to marriage and the number of births are to be diminished. The question "when is the number of children in a family too large?" is answered by Hegar as follows: "A maximal limit is easy to establish. The most suitable age for child-bearing is from twenty to forty. At an earlier and a later age than this, both the mother and the offspring are liable to suffer. Between two successive births there should be an interval of about two and a half years; this would leave time for the birth of eight

children. If we assume that pregnancy lasts nine months, that lactation is continued from nine to twelve months after delivery (and if the mother does not herself nurse the child, artificial feeding or careful supervision of the wet-nurse will occupy her for a like period), to devote an additional period of six months to nine months to the complete restoration of the mother's health cannot be regarded as excessive. For this maximum family we assume a perfect state of health on the part of the mother, a pure atmosphere, and a sufficient supply of all the necessities of life. Illnesses, weakness, or infirmity of the mother, often indicates that the number of children should be further limited. It is easier to provide a suitable dwelling and a pure atmosphere for a small family than for a large one. The same thing is true as regards the means of subsistence.

"If the reproductive function is to be intelligently controlled," continues Hegar, "above all it is necessary to devote attention to the age and health of the parents; but occupation, dwelling, and general environment, must also not be overlooked. Among the cultured classes of our Fatherland, people are gradually learning to form sound opinions about these matters. Among the working classes, on the other hand, especially among those engaged in factory labor, the heedless gratification of the sexual impulse is responsible for untold misery." Hegar's advice may be summarized as follows: If the marriage takes place after the attainment of complete maturity, in the wife at twenty and in the husband at twenty-five, and if procreation is discontinued in the wife at forty and in the husband at forty-five to fifty, if between successive deliveries the intervals necessary for the wife's restoration to health are maintained, if illness and states of debility

are taken into account, if sickly, hereditarily-tainted individuals are forbidden to marry—the excessive increase in population, as far as Germany is concerned, will cease to give cause for anxiety. The regulation of reproduction will, however, still be incomplete, unless we enforce a selection too rigorous for our present views. Moderation and continence must aid as far as may be necessary in preventing an undue increase in population. Hegar does not fail to point out the evil effects of an excessive limitation of the family.

In a marriage when only one child is born, this child is the object of unceasing anxiety and attention, and real or imaginary dangers assume an excessive importance in the morbidly excited imagination of the parents. Hence we find a continuous excess of watchfulness and over-education in the case of the only child, to whom independent thought and action are entirely unknown. Boys become milksops, girls nervous and hysterical. In the two-children-system, again, one or both of the children may die when the age of the parents is already considerably advanced. Still, in those districts of France in which this system obtains the population is well-to-do, and an exceptionally large proportion of the males are fit for military service. The use of various measures for the prevention of conception is considered by Hegar to be harmful, at any rate in the case of young women; this practice gives rise to anaemic conditions, and to nervous weakness and irritability, seldom, however, to more serious disorders, as, indeed, is apparent from the fact that the mortality of married women as compared with unmarried women is lower in France than in other countries.

Gräfe, with reference to the view that if for any reason conception must be prevented, this should be done by abstinence from sexual intercourse, remarks:

"Doubtless an ideal demand, but one which even those with exceptional strength of will are unlikely to satisfy. And the worst of it is, that even a single indiscretion will often result in impregnation. Moreover, it is distinctly contrary to natural conditions, that a healthy married couple united by an intimate affection should live together abstaining completely from sexual intercourse. The question has already been much discussed, both in speech and writing, and this will continue in the future, without altering the fact that the physician will be asked, and will be compelled to give, advice regarding the use of means for the prevention of pregnancy."

Ribbing writes, "Although the sexual impulse is the product of a powerful natural developmental force, still the temporary, and sometimes even the permanent, control of this impulse is a moral civilizing force of enormous importance." This writer is opposed to the use of artificial preventive measures; he considers them untrustworthy and dangerous to health. Untrustworthy, for the reason that nature has endowed living organisms with a strong impulse toward conjugation and has equipped with very powerful forces the processes by which fertilization is effected. Every physician is familiar with cases in which preventive measures have proved ineffective. This fact is proved also by the statistics of prostitution. Although prostitutes are fully instructed in the use of preventive measures, which they almost universally employ, nevertheless every year a smaller or larger number of prostitutes become pregnant. These measures are dangerous to health, partly because of their interference with natural functions, because many of them are clumsy and ill adapted; and partly, again, because owing to their use the woman fails to enjoy the natural periods of repose.

which are entailed by pregnancy, parturition, and lactation. Noteworthy, also, are the psychical considerations adduced by Ribbing against the use of preventive measures. The majority of well-bred women feel deeply wounded if they believe themselves to be regarded merely as a means of enjoyment, not as individuals, as persons with inalienable rights. For the man also there is danger, for it is easy for him to acquire a dislike to the wife who, even though on his own initiative, occupies herself with the technique of the sexual life in a manner which he feels instinctively to be opposed to the chastity and pure-mindedness demanded by every man from his wife. Ribbing, therefore, advises a certain measure of sexual abstinence in married life.

Max Nordau also insists on the moral disadvantages of the wide diffusion of the use of preventive measures. "If a race or nation has reached this point in its downward career, the individuals of which it is composed lose the capacity of loving in a healthy and natural manner. The sense of the family disappears; the men will not marry, because they find it inconvenient to burden themselves with the responsibility for another human life, and to care for any other creature than themselves; the women dread the pains and inconveniences of motherhood, and if they marry, they endeavor, by the employment of the most immoral means, to insure barrenness. The reproductive instinct, of which reproduction has ceased to be the aim, is in some annulled, whilst in others it degenerates into the most peculiar and irrational perversities. The act of sexual union, the most sublime function of the organism, is degraded into a profligate act of lust; it is no longer undertaken in the interest of the perpetuation of the species, but exclusively for the pleasure of the individ-

ual, and without any relation to the needs of the community."

Alfred Russel Wallace has advocated sexual continence as a preventive measure during the period of maximum vitality and strength; he advises that the age of marriage of women should be considerably advanced, in order to diminish their fertility. If woman's average age at marriage were 29, instead of 20 years, the fertility of marriages would be reduced in the ratio of 8:5.

The desired goal of artificial sterility will not, however, be reached through the advocacy of moderation and continence. The numerous additional measures employed for this purpose may be classified as *physiological* and *artificial*; the latter class may be further subdivided into *mechanical* and *operative*.

By physiological means for the prevention of conception, we understand measures which aim at producing sterility by reducing the number of acts of intercourse and by restricting these acts to certain defined periods of time. The physiological preventive measures, apart from the higher ethical value they possess in comparison with artificial measures, have the advantage that they may be regarded as harmless to the general health of the woman and to the integrity of her reproductive organs in particular; they have, however, this very serious disadvantage, that the results of their use are very uncertain, so that they offer no more than a probability, and often a very moderate probability, that conception will be prevented.

As a physiological measure for the attainment of facultative sterility "without breaking any moral law," Capellmann advised abstinence from coitus during a period of fourteen days after menstruation and three to four days before the commencement of the flow.

Without laying too much stress on the fact that by following this recommendation the period during which the intercourse is permissible would be extremely restricted, it is necessary to point out that, whilst in this way the occurrence of conception may be rendered less probable, its prevention is by no means guaranteed, for it is an established fact that a woman may be impregnated by intercourse on any single day of the intermenstrual interval. Capellmann's advice, embodying, as he expresses it, the "only morally permissible" means for the prevention of conception, was not original, for the same recommendation was given at an earlier date by Raciborski, who, however, regarded the measure as very uncertain. Capellmann is of opinion that it is sufficiently trustworthy for practical purposes.

Bebel, who is a declared opponent of Malthusianism, none the less lays down positive rules for the diminution of procreative capacity and of fertility by regulation of the diet. He refers to the example of the bees, which, by a change of nutriment, can produce a new queen-bee at will. "Thus the bees," he says, "are in advance of human beings in their knowledge of sexual development. Presumably they have not been compelled, for a couple of thousand years, to listen to sermons informing them that to occupy themselves about sexual matters is 'improper' and 'immoral.' There is no doubt whatever that the mode of nutrition has an influence on the composition of the male semen, and also on the susceptibility to fertilization of the female ovum; hence the increase in population must to a very important extent depend on the mode of nutrition. If this could be definitely established, we should have, in the supply of nutriment, a means of regulating the population. As an example of the effect, in this connection, of the mode of nutrition in the human species,

it is reported that in consequence of the fatty and nutritious diet of the old Bavarian peasants, who lived chiefly on very rich puddings, the marriages of the well-to-do peasants were frequently childless. However, it must not be forgotten that pre-conjugal intercourse, which was customary in that part of the world, and was somewhat promiscuous in character, may have contributed to cause this sterility." Finally, Bebel points out that the woman of the future "will be unwilling to bear a large number of children. She will wish to enjoy a measure of personal freedom and independence, and will not consent to pass half or three-quarters of the best years of her life either pregnant, or with a child at her breast. From this it will result that the population will be regulated, without unwholesome sexual abstinence, and without the employment of unpleasant preventive measures." However, Bebel gives us no details as to the precise manner in which this regulation is to be effected.

Tolstoi, in his widely celebrated book *The Kreutzer Sonata*, condemns absolutely the gratification of the sexual impulse. He demands the recognition of the fact that "sexual congress, in which a man either avoids the natural consequences—the birth of children,—or else throws the whole burden of these consequences on the woman, is opposed to the simplest demands of morality, is, in fact, utterly base." To render possible the sexual abstinence he regards as morally necessary, men must not only endeavor to live in a natural way, but they must consume no alcohol, eat with great moderation, abstain from meat, and not be afraid of hard work. Tolstoi even demands that men and women shall be so brought up "that both before and after marriage they may regard love, and the sensual passion associated therewith, not as they do at present, as a

sublime and poetical state, but as a bestial condition degrading to humanity." Tolstoi is, however, utterly opposed to the use of preventive measures: "first, because they liberate men from the cares and sorrows entailed by having children, which must be regarded as the penance to be paid for sensual love; and, secondly, because their use is closely allied to the crime most repugnant to the human conscience, the crime of murder." Chastity is no less a duty after marriage than before; after marriage man and wife must "continue to pray to be delivered from temptation, and must endeavor to replace sensual love by the pure relationship of brother and sister."

Eulenburg regards the modern diffusion and the continuous increase in the use of preventive measures as signs of decadence; Löwenfeld, on the other hand, regarding the social conditions of the present day as the principal source of the use of preventive measures, sees therein no moral decay, but on the contrary rather a rise in the moral standard of life.

Another physiological means of prevention is to be found in avoiding cohabitation in that season or month in which, judging by the woman's previous deliveries, she would appear to have been peculiarly susceptible to impregnation. Cohnstein maintained that in woman, as in the lower animals, the capacity for conception was associated with a particular season of the year, that there was, in fact, an individual time of predilection for impregnation. The assumption that there is such a time of predilection is, however, traversed by the fact, familiar to all who have recorded the birthdays of children in large families, that these occur in the most diverse months of the year. It has, indeed, been statistically proved that certain months and seasons are especially favorable to conception, that a maxi-

mum of conceptions occurs in the spring, and a second much smaller maximum in the winter; but these variations in the number of conceptions depend mainly on social factors, as, for instance, upon the customary season for marriage, opportunity for intercourse between the sexes, common labors in the house or in the open, etc. This alleged time of predilection for conception cannot, therefore, seriously be considered in the discussion of measures for the prevention of pregnancy.

As a physiological means for preventing conception, passivity of the woman during sexual intercourse has also been recommended. It is well known that an active participation on the part of the woman in the sexual act, by increasing her voluptuous sensations, gives rise to certain reflex actions, viz., descent of the uterus, rounding of the os uteri, induration of the portio vaginalis, and, finally, ejaculation of the secretion of the cervical glands and of the glands of Bartholin; these changes accelerate the entrance of the semen into the cavity of the uterus, and increase the motility of the spermatozoa. Upon this fact is based the assumption, that, in consequence of deficient sexual excitement during intercourse, either spontaneous, or when the woman intentionally remains "cold," the reflex actions by which the upward passage of the spermatozoa is favored, fail to occur; there is a good deal of evidence in favor of the truth of this view. Riedel reports regarding the women of the Island of Buru, that they often have sexual intercourse with strange men, "but during sexual congress in such cases they maintain a passive and indifferent state, for the purpose of avoiding impregnation." Von Krafft-Ebing points out that prostitutes, when having sexual intercourse with men to whom they are attached, experience voluptuous excitement, whilst in intercourse with men to whom they

are indifferent they remain entirely passive. From this it would appear that these uterine reflexes are under the dominion of the conscious will; but sufficient dependence cannot be placed on this fact in all circumstances for it to be possible to employ such voluntary control as a trustworthy means of prevention. Allied to this is the previously-mentioned Chinese practice of Kong-fou, a kind of hypnosis, in which during sexual intercourse the thoughts are concentrated on some other matter, and thereby conception is supposed to be prevented.

Artificial protraction of the period of lactation is an old and well-known method, practised by many savage peoples, for the prevention of fertilization. As a general rule, as long as lactation continues, amenorrhœa persists, and sexual intercourse remains unfruitful. But this rule also is not universally valid.

Artificial means for the attainment of facultative sterility are those by which the attempt is made to prevent pregnancy by some mechanical hindrance to the contact of the semen with the ovum, since without this contact conception cannot possibly occur.

The oldest of these means is that described in the book of Genesis (ch. xxxviii, verses 9, 10), congressus interruptus, where, however, the practice was punished by death, "And Onan knew that the seed should not be his; and it came to pass, when he went in unto his brother's wife, that he spilled it on the ground, lest that he should give seed to his brother. And the thing which he did displeased the Lord, wherefore he slew him." This mode of preventing pregnancy, in which the membrum virile is completely withdrawn from the vagina before the ejaculation of the semen takes place, is at the present time a very widely diffused practice; and, when properly carried out, it is thoroughly effica-

cious in the production of sterility. Thompson relates that this practice is employed by the Massai youths, who are allowed free intercourse with the girls, but if a girl becomes pregnant she is put to death.

The prolonged practice of coitus interruptus leads in my experience—in addition to the injury to the nervous system as a whole in consequence of the intense hyperæmia of the uterus and the uterine annexa, unrelieved by the occurrence of the orgasm—to a condition of stasis in the female reproductive organs; and this ultimately passes on into chronic metritis (with relaxation of the uterus, retroflexion or anteflexion, catarrhal disease of the mucous membrane, erosions, and follicular ulceration of the portio vaginalis), oöphoritis and perimetritis. As a result of certain remarkable observations, I must even regard it as not improbable, although actual proof is still lacking, that the recent striking increase in the frequency of neoplasma of the female reproductive organs is causally dependent on the ever-increasing employment in all circles of society of means for the prevention of pregnancy.

The evil effects of coitus interruptus for a woman are dependent on the fact that the woman fails to obtain complete sexual gratification, and that this has an important influence upon her entire organism. Owing to the failure of ejaculation to occur, the blood, which during the stage of sexual excitement has accumulated in the erectile structures and cavernous spaces of the genital passage, does not, as in normal conditions, flow rapidly away; but the congestion persists for an indefinite period, and is said by von Krafft-Ebing to give rise to functional disorders, and also to serious tissue changes. The functional disorders take the form of hyperæmia of the pelvic organs, and probably also

of the lumbar portion of the spinal cord (dull pain in the sacral region, a sensation of pain and dragging in the pelvis and in the lower extremities, lassitude); these symptoms often continue for several hours after intercourse. If this ungratifying coitus is frequently repeated, in a voluptuous woman, disorders of the reproductive organs ensue; and even more frequently, nervous disorders, in the form of neurasthenia sexualis. This author considers that, more especially in women, coitus interruptus, and unphysiological modes of sexual intercourse in general, are extremely potent causes of sexual neurasthenia—as potent as masturbation.

Beard, in his work on sexual neurasthenia, maintains that the sudden interruption of coitus (and also the use of condoms and similar appliances) is not only far more deleterious than unduly frequent normal intercourse; but he points out that it is necessary also to take into account the fact that (inasmuch as, owing to the unnatural mode of sexual intercourse, the possibility of fertilization is almost completely prevented) sexual intercourse is apt, in such cases, to be indulged in far more frequently, and often to gross excess. More particularly in such circumstances are evil effects on the nervous system likely to ensue, since we have a combination of excessively prolonged and frequent sexual intercourse, and of interference with complete sexual gratification.

Mantegazza believes that organic diseases of the spinal cord may actually result from congressus interruptus.

Hirt considers that even when marital intercourse is carefully regulated in respect of frequency, congressus interruptus may lead to neurasthenic manifestations.

Von Hösslin believes it to be indisputable that pre-

ventive methods of sexual intercourse may cause nervous troubles, and more particularly neurasthenic disorders, manifesting themselves chiefly in the sphere of the reproductive organs.

Eulenburg also declares that coitus interruptus is already a frequent cause of sexual neurasthenia in women, and that its evil influence in this respect is becoming more and more frequently manifest. He publishes two typical cases, in which, from this cause, in the one case, functional neuropathy, and in the other, local disorder of the reproductive organs, ensued.

Freud describes an "anxiety-neurosis," which is due to incomplete gratification of the woman during sexual intercourse. Coitus interruptus is almost invariably harmful to the man; to the woman it is harmful if the man thinks only of himself, and interrupts the coitus as soon as ejaculation is imminent, without concerning himself about the woman's state of sexual excitement. If, on the other hand, the man waits until the woman's sexual gratification is complete, the significance of such an interrupted coitus as far as the woman is concerned is that of normal intercourse.

Isolated authorities, as, for instance, Stillé and Thompson, have contested the alleged evil consequences of preventive methods of sexual intercourse. "It is habitual excess," says Fürbringer, "which does the mischief, not the unnatural character of the isolated act." Löwenfeld, who considers the opposition of medical men to "Malthusianism" not wholly justified, and believes that the dangers to health "which occur in isolated cases" are not very serious, maintains none the less that the medical man must advise his patients not to practise coitus interruptus. The mode in which conception is prevented is not, he thinks, a matter of

indifference to the woman. The use of occlusive pessaries and similar appliances does not in any way interfere with the normal development of sexual gratification and cannot, therefore, have any direct influence in the production of nervous disturbances. A forgotten occlusive pessary, however, has in many cases caused local disorder in the vagina. When the man is fully potent the use of condoms can do no harm to the woman, since the only effect of the condom (in a very excitable woman) is to render the development of the orgasm a little more difficult, but not to prevent it. *Congressus interruptus* itself is, according to Löwenfeld, harmful to the woman only when, owing to deficient potency in the male or to deficient excitability in the female, the interruption takes place before the occurrence of the orgasm.

Valenta declared that coitus interruptus was one of the chief causes of chronic metritis. Elischer saw perimetritis result from this practice; Gräfe enumerates, as consequences of frequently repeated coitus interruptus, chronic hyperæmia of the uterus and oöphoritis; Goodell observed elongation of the cervix uteri; Mensinga, infarction of the uterus, œdema of the portio vaginalis, ulceration of the cervix, hysterical paroxysms, convulsions, cephalalgias, cardialgias, etc. Lier reports a case in which, after three years' continued practice of coitus interruptus, the menopause set in, with atrophy of the uterus; Ascher, in a similar case, saw chronic metritis ensue. According to Kleinwächter, coitus interruptus is harmful to the woman to an extent by no means trifling, whereas the man, in whom ejaculation occurs, suffers comparatively little. Fehling believes that when coitus interruptus is practised only a small proportion of women experience sexual excitement. Neugebauer states that among the

very numerous cases of uterine carcinoma he has treated, the majority of the patients admitted having practised coitus interruptus. Pigeolot makes a similar statement.

It must, however, be admitted that a certain number of medical men absolutely deny the dangers of coitus interruptus, whilst others consider them altogether trifling. Just as the trend of modern opinion is to believe that in normal men and women the dangers of masturbation are far less serious than was formerly maintained, so also many are now found to maintain that coitus interruptus is harmful only to those with hereditary neuropathic predisposition. Still more unwilling are many to admit that other preventive methods do women any harm. Thus Wille maintains that the continued fear of pregnancy will in most instances do more injury to the feminine nervous system than all the preventive measures in the world. To the nervously weak woman a trustworthy preventive of pregnancy is therefore often necessary and most helpful.

THE DETERMINATION OF SEX

The problem of the determination of sex in the human species is one which has occupied natural philosophers from the very earliest times, and has always greatly interested all classes of the population.

The interest awakened by the subject depends principally on the fact that female children have usually been less desired than male in all periods of history and among almost all races. In the uppermost circles of society the truth of this statement is manifested by the fact that the birth of a prince is announced by a salute of 101, that of a princess by a salute of 35 guns only.

It would serve no useful purpose to transcribe here the opinions, or rather guesses, which were ventured on this topic in earlier days when the very nature of the reproductive process was still entirely unknown, and we shall merely mention that the curious will find various references to the determination of sex in the works of Hippocrates, Aristotle, Plutarch, Soranus, Susruta and Galen.

Broadly speaking, the earlier theories may be said to diverge in two main directions, some holding that the sex of the infant was in some way determined by the mode of intermixture of the male and the female elements in the act of generation, and others maintaining that sex was already inalterably predetermined at the time of intercourse either in the male or in the female sexual elements.

Pari passu with the modern development of the theory of evolution, and with the enormous increase in recent days in anatomical and physiological knowledge, the theory of the determination of sex has been very widely extended. The rival views may be briefly arranged in the four following categories:

I. That sex is already inalterably predetermined in the ovum, upon the constitution of which it solely depends; there are therefore male and female ova, and the process of fertilization exercises no influence whatever upon the determination of sex. The alternative theory to the above, that sex is determined solely by the constitution of the fertilizing spermatozoon—*i.e.*, that the spermatozoa, and not the ova, are male and female, respectively—is one which in recent years has tended more and more to disappear from the field.

II. That sex is determined in the moment of fertilization by the reciprocal interaction of male and female, of zoösperm and ovum. One variant of this

theory maintains that each reproductive element strives for the reproduction of its own sex; that a struggle takes place and that the victor in the contest stamps its own likeness upon the fertilized product. According to another view, however, sex is not directly transmitted in this manner; it is supposed that the more powerful the proper reproductive element (according to this theory the ovum) the more strongly does it tend to determine the reproduction of a stronger, *i.e.*, a male organism; thus the greater potency of the female element in the act of reproduction tends to favor the determination of the male sex.

III. That sex is not determined until after fertilization, during the early stages of the development of the embryo; the determining causes are supposed to be various factors capable of influencing the developing organism during this period, and more particularly the nutritive conditions of the mother.

IV. That the determination of sex is not dependent solely upon the action of any single one of the factors above enumerated, but arises as a resultant effect of the operation on the germ of all three of these acting in temporal succession.

Modern physiology has endeavored to solve this problem by statistical investigations, by anatomical demonstration, and finally by experiment.

STERILITY IN WOMEN

When we study the history of human civilization we find that sterility in women is regarded, not merely as a misfortune, but as a reproach. Among savage races, and in the Orient, where the position of women is one of strict subordination, she does not attain an honorable status until she becomes a mother. In Persia, a sterile woman is always divorced by her husband. In India,

also, when a sterile married woman has in vain employed the various religious measures advocated for the relief of her barren condition, she is sent back to her parents. Both in China and Japan, a barren woman is regarded as a most miserable creature. Among the negro races, a woman who fails to bear children is the object of scorn and contempt. Among the Dualla negroes, a man whose wife fails to bear children demands from her parents the return of the sum which he paid for her at the time of marriage. Many of the indigenous tribes of South America also make a practice of divorcing a sterile wife. Among the better-class Circassians, the women do not attain an assured position until they have borne a child. In Angola a barren woman is the object of universal contempt, and she often feels the ignominy of her position so keenly that she commits suicide. Alike among the Jews and among the Turks, barrenness in a wife is a recognized ground for divorce, and the woman who has been divorced for this reason will hardly ever succeed in obtaining another husband, for she is regarded as one whose body is not properly developed. According to old German law, barrenness in a wife and impotence in a husband were both grounds for divorce.

The code of the Emperor Justinian allowed of divorce in cases in which for the space of two years a husband had been unable to fulfil his marital duties, and such a union was termed *innuptæ nuptæ*. Among the ancient Romans, although they regarded barrenness as a mark of the divine disfavor, according to the laws of Augustus failure to bear children was a punishable offence, and such a punishment was incurred by any married woman who had attained the age of 20 years without having become a mother. In ancient Greece, also, divorces due to the barrenness of the wife were by

no means uncommon. Among the Slavonic peoples sterility was so greatly despised that there is a Slavonic proverb which runs: "A woman is no woman until she has borne a child"; and in Istria a sterile woman is known by the nickname "Scirke," which is equivalent to "hermaphrodite." The Jewish view of the matter is expressed in the Talmudic rabbinical saying: "A wife's duties are beauty, gentleness, and the bearing of children"; and again, "the poor, the leprous, the blind, and the childless, are like the dead"; and, finally, "he who refrains from marriage with the deliberate intention of having no children, incurs the guilt of murder." In the Koran we find the fatalistic expression, "God makes a woman barren in accordance with his will."

We can, therefore, readily understand that in the most ancient medical writings the question of sterility in women is a matter of earnest consideration. In the works of the early physicians of Hindustan we find several apt remarks on the subject. Susruta says: "Pregnancy most readily results from intercourse during menstruation. At this time the os uteri is open, like the flower of the water lily in the sunshine." In the Old Testament, in which the newly-created human couples receive the command, "Be fruitful and multiply, and replenish the earth," we find frequent references to barrenness as a state equally dishonorable and unfortunate, and the use of certain plants is recommended as a means of cure. The Talmud contains several essays dealing with the causes and treatment of sterility.

The Hippocratic collection of writings contains a number of passages dealing with the causes of sterility and with the means to be employed for its relief. We shall have occasion later to refer to these recommenda-

tions. Celsus, on the other hand, has little to say on this subject. In the works of Pliny, and also in those of Aristotle, there are references to the topic of sterility.

Among the writers of the first century of our era, Soranus discusses exhaustively the capacity for conception and sterility. In his work we find, among other passages, the unquestionably accurate remark: "Since the majority of marriages are concluded, not from love, but in order to procreate children, it is difficult to understand why, in the choice of a wife, less regard is paid to her probable fertility than to the worldly wealth of her parents."

In the Middle Ages, Paulus Agineta more especially treats of the diseases of women, and among these, of sterility in women. That in Arabian medicine much attention was paid to this question, we can learn from the writings of Maimonides.

By sterility in women we understand the pathological state in which a woman who is sexually mature fails to conceive, notwithstanding frequently repeated, normal sexual intercourse throughout a considerable period of time.

Sterility is termed *congenital* (or *absolute*) when, notwithstanding repeated intercourse throughout a long period (not less than three years), pregnancy has always failed to ensue; it is termed *acquired* (or *relative*), when women who have already been pregnant once or more often, cease to conceive, although they are still quite young enough to do so, and have experienced regular sexual intercourse for a long period (not less than three years). In a wider sense of the term, we say that a woman is sterile, when, notwithstanding prolonged and repeated sexual intercourse, in circumstances favorable to procreation, she has failed to give birth to a living and viable infant.

English authors also make a special distinction regarding that form of acquired sterility (which is no great rarity), in which a woman gives birth to a single infant and subsequently remains sterile ("only-child sterility").

The civilization of the present day, with its shady side, has made it necessary for us to pay an increasing attention to *facultative sterility*, dependent upon the use during intercourse of means for the prevention of conception; and very recently the surgical tendency of modern gynecology has brought into being a new variety of sterility in women, viz., operative sterility.

The period which must elapse after marriage, before the absence of pregnancy must lead us to regard a woman as sterile, is fixed as three years. This limitation is based upon the statistical data which I gave regarding 556 fruitful marriages on page 228.

The ideal state of fertility, that in which conception is the immediate result of the first act of intercourse between husband and wife, the conception being followed in due course by the birth of a child, is, like most other ideals, one very rarely attained. In the human species, conception as the immediate result of the first act of sexual intercourse, is an extremely unusual occurrence. To invoke medical assistance for women who have failed to conceive during the first three months of married life, which my experience shows to be more frequently done now than formerly, is devoid of all justification; and still worse is it, in this period of "early love" to subject women, as has often been done recently by overenergetic gynecologists, to local treatment, even to the extent of operative procedures.

We are not justified in speaking of the existence of actual sterility until three years of marital intercourse have failed to result in conception; still, when the com-

mencement of the first pregnancy is delayed for more than sixteen months after marriage, there is considerable probability that the woman is sterile; and this probability increases month by month till the expiry of the second year, whilst as the end of the third year approaches, it becomes tantamount to certainty.

Sterility is one of the commonest of the functional disorders of women, and one of those which most often demand gynecological assistance.

By a statistical study of the marriages of the royal and princely families of Europe and of the marriages of the highest families of the aristocracy, I learned that of 626 marriages, 70 were barren; thus the ratio of fruitless to fruitful marriages proved to be as 1:8.87. But in other circles of society, in so far as data relating to the matter were obtainable in my practice, the statistics of infertility were by no means so unfavorable, the ratio working out at about 1 barren to 10 fruitful unions. I must point out, however, that these statistics, like all statistics of fertility, are to a degree invalidated by the fact that in a certain number of the instances included among the barren, an unnoticed abortion may have occurred.

Simpson, in his investigation regarding the frequency of sterile unions, found a ratio of 1:8.5 (in 1,252 instances). In the English aristocracy, where the marriages are for the most part restricted among the members of a comparatively small number of families, the ratio was 1:6.11 (495 instances); on the other hand, among the population of Grangemouth and Bathgate, consisting chiefly of persons engaged in seafaring and agricultural occupations, the ratio of barren to fruitful unions was as 1:10.5.

Spencer Wells and Marion Sims, as a result of their investigations, give a ratio of 1:8.

According to Seeligmann, in Hamburg, among marriages of persons in all classes of society, 11.5 per cent. are barren. Prochownick found among 2,500 women, all of whom had been married for eighteen months or more, and none of whom were more than 40 years of age, that 9 per cent. had failed to conceive.

According to Frank and Burdach, who do not publish the figures upon which their estimate is based, only 1 marriage in 50 proves barren. Lever, who also gives merely his percentage result, states that 5 per cent. of married women are completely infertile. Hedin, dealing with a Swedish community of 800 persons, states that the percentage of sterile unions is barely 10.

According to Goehlert's statistical investigations, in the dynasty of the Capets, among 450 marriages, 19.7 per cent. were sterile; in the Wittelsbach dynasty (Bavaria), among 177 marriages, 23.7 per cent. were sterile; and among the ruling families of Germany (more than 600 marriages), 20.5 per cent. were sterile. In this investigation, however, no attention is paid to the age of husband or wife; marriages and remarriages are classed together without discrimination; and those marriages only in which a living child was born are counted as fruitful, so that the unions counted as sterile must contain many in which abortion or stillbirth occurred. In three Estonian communities in Livonia, Oehren found that among 2,799 marriages, 8.4 per cent. were barren, but in this instance also stillbirths were ignored.

Ansell reports that of 1,919 marriages of women belonging to the upper classes, their mean age being 25 years, 152 proved barren, a proportion of 1:12, or about 8 per cent.

Matthews Duncan communicates the following data:

In the year 1855, in the cities of Edinburgh and Glasgow, 4,447 marriages were contracted, and of these 725 proved barren, a proportion of 1:6.1; 75 of these may, however, be excluded from consideration, inasmuch as the wives were already at the age of 45 or upward. Among the remaining 4,372 marriages, 662 proved barren, a proportion of 1:6.6. In other words, 15 per cent. of all marriages of women between the ages of 15 and 44 proved sterile.

From France we obtain figures showing a much higher proportion of sterile unions. According to Rochard, in France in the year 1888, of ten million families, two million had no child at all, and two million had each an only child, so that two-fifths of the families of France were taking no practical part in the maintenance of the population. According to Chevin, the proportion in France of barren to fruitful marriages is as 1:5; 20 per cent. are entirely barren, while 24 per cent. exhibit only-child-sterility.

From Massachusetts, Morton reports that according to the last census returns one-fifth of all married women are childless.

In England, numerous trustworthy statistics can be obtained regarding the frequency of sterile marriages. The average proportion of barren to fruitful unions was:

Among the patients in St. Bartholomew's Hospital.....	1:8
Among the inhabitants of Grangemouth.....	1:10
Among the inhabitants of Bathgate.....	1:10
Among the British peerage.....	1:6
Among the upper classes.....	1:12
Among the inhabitants of Edinburgh and Glasgow.....	1:7

Ansell bases upon the observations made by him in the case of 152 sterile women the conclusion that there

is no longer any chance of the occurrence of pregnancy if a woman is:

More than 48 years old, and has had no child for.....	2 years
More than 47 years old, and has had no child for.....	3 years
More than 46 years old, and has had no child for.....	4 years
More than 45 years old, and has had no child for.....	6 years
More than 44 years old, and has had no child for.....	8 years
Less than 44 years old, and has had no child for.....	10 years

If we take into account also cases of acquired sterility, the proportion of barren to fruitful marriages becomes even more unfavorable, and the proportion increases enormously if, with Grünwaldt, we number among the barren women those who fail to continue childbearing up to the normal climacteric period. Grünwaldt, dealing with about 1,500 women suffering from affections of the reproductive organs, excluded all those who were either virgins or widows, and also all those who at the time of the observed barrenness were over 35 years of age; this left more than 900 women suffering from affections of the reproductive organs, all of whom were sexually mature, and were living in marital intercourse; of these, nearly 500 were barren, 300 being instances of acquired sterility, and 190 instances of congenital sterility. Thus, according to this observer, disease of the reproductive organs in women led in more than 50 per cent. of the cases to disturbance of the reproductive capacity; about one in every three women, previously competent to bear children, became barren when affected with disease of the reproductive organs; and among every five gynecological patients of the condition already specified as regards age and sexual intercourse, one proves congenitally sterile.

It must not, however, be forgotten, that sooner or later after marriage artificial sterility tends to come

into being, its early or late appearance depending upon the degree of civilization and upon the national and economical conditions of the people and the individuals concerned. This fact must not be left out of the account.

The manner in which, in the human species, fertilization is effected, is still far from clear in all its details; hence it is easy to understand, that the etiology of sterility remains in many respects obscure. It is impossible in every case to find a definite cause. Whereas, on the one hand, notwithstanding, the existence of apparently insuperable obstacles, impregnation may nevertheless be effected; so, on the other hand, sterility may exist in cases in which all the circumstances appear favorable to the occurrence of conception. Hence a classification of the different varieties of sterility from the etiological standpoint is a very difficult task, and the conclusions thus obtained are often vitiated.

Although it cannot be denied that mechanical causes are competent to lead to sterility in women, Sims, in his advocacy of the mechanical doctrine of sterility, widely overshoots the mark. His authority, however, has led to a general acceptance of this doctrine, which is by no means justified by facts. The theory of mechanical obstruction, according to which sterility in women depends upon mechanical obstacles to the passage of the spermatozoa toward the ovaries, is from time to time strikingly illustrated by cases coming under our notice—cases the nature of which can hardly be overlooked; but it is quite wrong to suppose that this causation accounts for the majority of instances of sterility in women, and strict limitations should be placed upon the employment of surgical measures based upon this mechanical theory of sterility.

The mechanical view has been counterposed by

Grünewaldt with a doctrine in which special stress is laid upon obstacles to utero-gestation, sterility being regarded as a functional disorder brought about by affections of the female reproductive organs rendering the uterus unfit for the incubation of the ovum. It cannot be denied that the elucidation of this casual influence was a valuable contribution to the theory of sterility, and it is unquestionable that many morbid conditions of the uterus exist capable of giving rise to sterility in this manner; but we must avoid the error of regarding this doctrine as a full explanation of the cause of sterility.

If, however, both of these theories of sterility are insufficient, we cannot regard a third theory, that of Matthews Duncan, as filling the gaps in our knowledge. It would be most unfortunate if this author were right in maintaining that all our knowledge of the causes of sterility is to be summed up in the phrase "deficient reproductive energy"; we cannot agree with Duncan in his belief that "Sterility is an imperfection devoid of all perceptible, measurable characteristics"; nor can we follow him when he maintains that local causes, whether they are such as hinder conception, or such as hinder utero-gestation, have a very limited sphere of activity. Matthews Duncan adopts an incomprehensible standpoint when he regards sterility as dependent upon a law of nature, as a condition which may affect distinct classes or an entire population.

According to the latest doctrine of sterility, only in quite exceptional instances is the woman regarded as responsible for the occurrence of sterility; contrariwise, the male genital organs are commonly blamed for the affection, which is in the overwhelming majority of cases supposed to be due to azoospermia, usually dependent upon gonorrhœal infection; compare

with this the fact that affections of the female reproductive organs are said to play a quite subordinate rôle in the etiology of sterility. But for my part, though I recognize the important share that gonorrhœa in the male plays in the cause of sterility, I am of opinion that the extreme view just mentioned is by no means justified by the facts.

Sterility, a functional disturbance of an extremely complicated nature, can, in my opinion, be most usefully elucidated from the etiological standpoint by starting with the assumption that three conditions are absolutely essential to procreation:

1. That ovulation proceeds in a perfectly normal manner, the maturation of the discharged ova being complete;
2. that normal spermatozoa have access to these normal ova (conjugation of male and female pronuclei);
3. that the uterus is properly adapted for the gestation of the fertilized ovum.

My classification of the varieties of sterility corresponds to these conditions of procreation:

1. Sterility due to incapacity for ovulation;
2. sterility due to some hindrance to the conjugation of ovum and spermatozoon (under this head come also those cases in which the male is at fault—azoospermia, and the like);
3. sterility due to incapacity for gestation.

It must also be admitted that there are additional causes of sterility, causes which lie beyond our control. Moreover, as I have already mentioned, in most cases of sterility, we have to do, not with a single cause, but with the resultant of two or more coöoperating causes.

Incapacity for Ovulation

Incapacity for ovulation, the first and most decisive cause of sterility in women, may be absolute and irremediable, or relative and transient. We have to do with the former in cases in which the ovaries are entirely wanting, or when they are affected with organic disease to such a degree that they have become incapable of fulfilling their function of ovulation; incapacity for ovulation is, on the other hand, relative and transient in certain pathological states of the ovary and neighboring organs, when there is incomplete development or partial atrophy of the ovaries, when there are new-growths of the ovaries, in cases of oophoritis and perioophoritis, in consequence of disturbances of innervation, diseases of the central and peripheral nervous system, violent emotional disturbance, constitutional disorders, such as syphilis, chlorosis, anæmia, universal lipomatosis, scrofula, alcoholism, and morphinism, also in consequence of changes in the supply of nutriment and in the general mode of living, or of senile changes, and finally in consequence of hereditary influences.

The diagnosis of the etiological influence of suppressed or incomplete ovulation in the production of sterility in women is at times beset with great and even insuperable difficulties. The state of the menstrual function, suppression of the flow, or the regularity or irregularity of its occurrence, serve indeed to inform us as to the general activity or inactivity of the function of ovulation; but the variations in this function give no certain information as to whether a woman is fertile or infertile. Knowing, as we do, that, generally speaking, an intimate connection subsists between menstruation and ovulation, we are indeed able to assert that regular menstruation and fertility in wom-

en run a parallel course, and further, that the greater the irregularity of the menstrual function, the greater the tendency to sterility. Recently, great advances have been made in the technique of manual exploration of the ovaries, and by means of vaginal and rectal bimanual examination, we are now able to obtain accurate information regarding abnormalities in the size, shape, and position of these organs, and regarding any other intra-pelvic disorders. In this way we have been enabled to recognize a number of pathological states of the ovaries which affect the functions of these organs.

In some cases also there are general symptoms which furnish us with the means of drawing conclusions, more or less trustworthy, regarding the state of the ovarian functions; for instance, the general development of a woman's body, the condition of the external genitals, the vulva, the mons veneris, the pubic hair, the clitoris, and the mammae. Again, we can derive information from various troubles of which women complain; such as sacrache; a sense of weight and pressure in the pelvis; feelings of tension and shooting pains in the breasts; flushings of the face; haemorrhage from the nose, mouth, or rectum, recurring at regular intervals and vicarious in nature. In many instances, however, it will only be by obtaining data regarding the age, mode of life, and family history, of the person affected, that it will be possible to draw conclusions as to the cause of the sterility.

The female reproductive glands, the ovaries, may, owing to developmental disturbances during fetal life, either be entirely wanting, or they may merely be deprived of certain structural constituents, especially their epithelial elements. In the former case, we have congenital complete unilateral or bilateral absence of

the ovary, a condition most commonly associated with the absence or with a rudimentary condition of other portions of the reproductive apparatus; in the latter case, we have the condition somewhat inappropriately named congenital atrophy of the ovary.

Complete absence of both ovaries necessarily leads to absolute sterility. Both congenital absence and congenital atrophy of the ovaries, will usually be found in association with other anomalies of the sexual organs. Absence of one ovary, on the other hand, by no means entails sterility; on the contrary, when a single well-formed ovary exists, ovulation usually proceeds in a perfectly normal manner. When such women marry, pregnancy usually follows in the normal proportion of cases; and, in complete opposition to one of the theories of the determination of sex to which allusion has been made, such women bear children of both sexes.

Morgagni described a case of congenital absence of both ovaries in a woman 66 years of age, in whom the external genital organs, the vagina, and the uterus, were imperfectly developed, but the Fallopian tubes were of normal size. Careful examination of the upper borders of the broad ligaments of the uterus disclosed no trace of ovary on either side.

Quain, in a virgin 33 years of age, found the vagina rudimentary, with its mucous membrane but slightly corrugated; at the upper end of this passage was a semilunar fold which probably represented the uterus. The ovaries were absent; a small gland-like body embedded in the left wall of the vagina was regarded by him as a rudimentary ovary. The configuration of the body was feminine, feminine also the disposition; moreover, there was a monthly recurrent epistaxis.

The atrophy of the ovaries which normally takes place at the climacteric period, has constitutional

effects similar to those dependent upon absence or congenital atrophy of the ovaries.

A rudimentary condition of both ovaries, or bilateral atrophy of these organs, with or without associated atrophy of the entire reproductive system, commonly entails sterility. In such cases, in addition to amenorrhœa, we usually find that the breasts are but slightly developed, the pubic hair is scanty, the labia majora and labia minora are small, whilst sexual appetite is deficient, and during coitus the woman is entirely passive.

On the other hand, we must not make the mistake of inferring from the fact that the sexual appetite is keen and coitus pleasurable, that therefore the capacity for ovulation is normal. Even after operative removal of both ovaries, some women have assured me, not only that the sexual impulse was as strong as formerly, but even that they continued to experience the sexual orgasm in its full intensity. This is analogous to the well known fact that men who have undergone castration after arriving at sexual maturity may remain capable of performing coitus. It is a matter of history that in the lupinars of ancient Rome, castrated men were kept to enable women to enjoy the pleasures of sexual intercourse without fear of consequences; and it is said that such men are to be found in Italian brothels to this day. In the case of the lower animals, it appears to be the rule that when the reproductive glands are removed in early youth, every trace of sexual desire disappears.

Incomplete development of the ovaries, with consequent defective ovulation, may result from marriage in girls who are still immature—a fact already known to Aristotle, who wrote, “premature marriage leads to a scanty progeny—that this is the case in man as well

as the lower animals is witnessed by the weakly inhabitants of regions in which child-marriage is common."

It is shown by statistical data that the age at which puberty occurs, the age, that is, at which the menstrual flow begins, has a relation to sterility; and the same is true as regards the age at marriage. In the former connection, women in whom puberty is comparatively early, are less often sterile than those in whom puberty is comparatively late. Emmet, in an investigation embracing 2,330 cases, showed that in our climate the average age at which the first menstruation occurred was 14.23 years, and that in the case of women who subsequently proved fertile, the first flow took place on an average 26 days earlier than in the case of women who subsequently proved barren. We also learn from Emmet's tables that the mean duration of menstruation and the mean quantity of the flow are larger in fertile than in barren women.

As regards the influence of the age at marriage upon fertility, in women who marry between the ages of 20 and 24 years, sterility is most frequent; it is commoner in women who marry between the ages of 14 and 20; after the age of 25, the proportion of sterile women increases with each year to which marriage is postponed.

Premature atrophy of the ovaries, with consequent incapacity for ovulation, may occur in a great variety of conditions; it has been observed in scrofula, diabetes, rickets, phthisis, and malarial cachexia; it also occurs in certain chronic intoxications, as from the long-continued use of opium or morphine, and from the abuse of alcoholic beverages. According to the observation of Burkart, Levinstein, and Erlenmeyer, morphinism is a condition which may be relied upon to bring about

amenorrhœa and temporary sterility from cessation of ovulation. It has been asserted but by no means proved, that the long-continued administration of quinine hinders ovulation. As a result of various acute and chronic disorders, a simple atrophy of the ovarian follicles can be detected, dependent upon simple fatty degeneration; this has been seen by Grohe in children as a result of general atrophy, and also following caseous and suppurative diseases of the respiratory organs; by Slavjansky in children after chronic pneumonia and chronic dysentery, and in adults as a sequel of typhoid, and in one instance as a sequel of puerperal septicæmia.

Hyperplasia of the ovarian stroma, in slighter degrees of the affection, leads to menstrual disturbances, partly of nervous and partly of inflammatory nature, and in more severe degrees leads to sterility dependent upon the hindrances which the thickened tunica albuginea offers to the bursting of the mature follicles. Klebs believes that this anomaly is always due to a disposition acquired very early in life, and perhaps at the time when the ovaries are first developed.

Follicular cysts of the ovary, which are formed mostly at the time of puberty, and originate under the influence of menstrual congestion, from graafian follicles near to ripeness, are competent to cause sterility, owing to the pressure they exercise upon the superficially placed rudimentary follicles, leading to the atrophy of these latter. Other new-growths of the ovaries have similar effects, such as adenomata, carcinomata, dermoid cysts, cystomata, sarcomata, and fibromata. In many cases of these disorders, however, the ovarian follicles may for long periods remain unaffected; and in these instances, ovulation, menstruation, and even conception, may proceed undisturbed.

Even in cases in which a neoplasm attains a great size, if it affects one ovary only, ovulation may occur normally in the other, and conception may ensue; and even in the diseased ovary, if small portions of its tissue remain unaffected, ovules may be discharged from these portions. The minutest portion of healthy ovarian tissue, though all the remainder has been destroyed by disease, may suffice to bring about conception.

Ovarian tumors appear with considerable frequency to be complicated with sterility; but in such cases the question always remains open, whether in the majority of instances the sterility is to be regarded as the cause or as the consequence of the ovarian disease. Boinet's figures dealing with this problem are the most striking of all. He states that of 500 women with ovarian tumors, 390 were childless. But these results are challenged by other observers. Veit's estimates, based upon a compilation of the figures of Lee, Scanzoni, and West, is that 34 per cent. of women with ovarian tumor are sterile. On the other hand, Negroni's collection of 400 cases of ovarian tumor, including both married and unmarried, contained 43 only who had never been pregnant. Other lists show: 13 sterile women among 45 suffering from ovarian tumor (von Scanzoni); 1 sterile among 21 (Nussbaum); 8 sterile among 63 (Olshausen). Winckel, among 150 sterile married women, found 32 suffering from ovarian tumor, which in two of these cases only was bilateral. Atlee, in 15 cases of ovarian tumor, observed premature cessation of menstruation at the ages of 30, 39, 40 and 42, respectively.

Although in many cases sterility develops coincidentally with the growth of an ovarian cystoma, yet in many other women such tumors have no influence in diminishing fertility. Martin, in a case in which ste-

rility existed in connection with a unilateral ovarian cystoma, the other ovary being healthy, observed pregnancy as a sequel of the removal of the diseased ovary. In one of these cases, after removal of the ovarian cystoma, Martin punctured in the other ovary a dropical follicle which had attained nearly the size of a walnut. Pregnancy in this case also followed the resumption of marital intercourse. Müller reports that in his clinic within recent years pregnancy, complicated with ovarian tumor, has been observed in 7 instances; in one of these cases the pregnancy occurred notwithstanding the fact that the new-growth was so large as almost to fill the abdominal cavity. Holst reports the case of a multipara 43 years of age who died in the 18th to the 20th week of pregnancy; at the post-mortem examination the left ovary was found to be transformed into three cysts, each the size of an apple, whilst in place of the right ovary was a medullary carcinoma the size of a man's head; on neither side could a trace of normal ovarian tissue be detected. Spiegelberg, in a woman who died shortly after giving birth to her second child, found that both ovaries were transformed into myxo-sarcomatous tumors; in a woman aged 42, who died four weeks after her eleventh confinement, both ovaries were found to be transformed into nodular carcinomatous tumors, each larger than a child's head; in none of these ovaries was any normal stroma to be found. Ruge reports the case of a woman 36 years of age, who miscarried in the sixth month of pregnancy; she had myxo-sarcoma of both ovaries, one weighing 5,620 grammes, the other 480 grammes.

All these cases indicate that, notwithstanding the existence of extensive degeneration of both ovaries, some minute remaining fragment of healthy ovarian

stroma is competent to produce normal mature ova—a fact which has often been proved also by microscopical examination. That under the influence of pregnancy, existing ovarian tumors often take on extremely rapid growth, is also indicated by some of the above cases.

Among the causes of sterility, these three conditions: anæmia, chlorosis, and scrofula (tuberculosis), play a leading part; indeed, their importance in this connection has hitherto been underestimated, more especially in regard to the comparative frequency with which they cause sterility. A large part of the favorable influence in the relief of sterility in women which is exercised by the "cures" at various watering-places, depends upon the amelioration which is thus effected in the aforesaid constitutional disorders.

It has been assumed that diabetes, which renders men impotent, is competent also to cause sterility in women. Hofmeier reports a case which appears decisive on this point. In a woman 20 years of age, who had menstruated regularly since she was 14 until a year previously, when the flow had ceased, he found the uterus extremely small, barely 5 cm. (2 in.) in length, extremely atrophied, the ovaries also atrophied and very small; the urine contained large quantities of sugar. Here was doubtless a case of atrophy of the reproductive organs secondary to diabetes.

In England, where the excessive use of alcohol is observed very frequently in women as well as in men, sterility has frequently been regarded as a result of chronic alcoholism. Matthews Duncan reports cases which lead to the belief that alcohol has a specifically deleterious effect upon fertility. Apart from the general or constitutional disturbances dependent upon the abuse of alcohol, this agent has in many cases a

well-recognized pathogenic influence upon the female reproductive organs, the morbid condition which is most frequently and most readily assignable to this cause being chronic oophoritis. The obesity which so frequently results from alcoholic excess is a contributory cause of sterility.

Certain drugs, more especially quinine and morphine, are reputed to cause sterility. Davies, reviving an old opinion, considers that of all drugs tannin is the most effective in leading to sterility, and he considers tea-drinking as responsible for this effect.

The influence of certain cerebral affections and psychical disorders in checking ovulation has been established. Thus, de Montyel has recently shown that in families subject to hereditary mental disorders, there is an unusual large proportion ($1:7$) of barren marriages.

In addition, there are many influences which are known to prevent or to diminish ovulation in the case of the lower animals, and which may therefore be assumed with considerable probability to have a similar effect in women. More especially we are here concerned with external influences affecting unfavorably nutrition and innervation, and therewith also ovulation; also near kinship between the parties to the act of intercourse; and finally hereditary predisposition. In animals, captivity, exposure to cold, overexertion, insufficient or unsuitable food, and inbreeding, have been proved to result in infertility.

Doubleday asserted that "a too abundant supply of nutriment hinders reproduction, whereas on the other hand insufficient or improper food favors reproductive activity and increases the number of the offspring." Spencer, however, rightly points out that the infertility noticed in these circumstances is not the direct result

of prosperity, but depends upon the pathological obesity which is thus engendered by overfeeding.

No less interesting are the observations that have been made regarding sterility in animals in confinement. In such animals there are wide differences. Some refuse to cohabit, or have lost sexual desire; others, again, show excessive sexual desire and cohabit too often, without any result; or even if fertilization occurs, abortion often ensues. In yet other cases, though conception follows intercourse, and the animals go on to full term before delivery, the young are still-born, or are weakly and misshapen. Caged birds often lay no eggs at all or very few; or if they do lay, they neglect their eggs; or if incubated, the eggs fail to hatch out. In France, experiments regarding this matter were made with domestic fowls. If the hens were given great freedom, 20 per cent. only of the eggs remained unhatched; with less freedom, 40 per cent. of the eggs were failures; whilst if the fowls were kept in a coop, 60 per cent. of the eggs were unhatched.

"Convincing proofs," writes Darwin, "have been obtained to the effect that wild animals which have recently lost their freedom have their fertility diminished to a most remarkable extent. This infertility is not dependent upon any degeneration of the reproductive organs. There are many animals of the most diverse species, which, whilst they copulate freely in confinement, fail in these circumstances to conceive; others again, even if they conceive and have living young, give birth to these in numbers which are unquestionably much smaller than would be the case were the parents in the free state."

Interesting observations have been made by pigeon breeders. They state that when pigeons brought up

in the same nest pair, the number of their offspring is usually very small.

The influence upon fertility of unfavorable conditions of temperature, either excessive heat or excessive cold, is very great. In the case of pigeons, for instance, if the pigeon cot is adjacent to the heated wall of a dwelling house, the pigeons sometimes begin to lay as early as January, and may have young as often as eight times in a single year. When the dovecot is cold, on the other hand, the number of broods is smaller. In general, the procreative capacity is greater in summer than in winter.

As regards inbreeding, many facts are on record showing the influence of this practice in leading to the birth of malformed offspring and to sterility. Darwin writes, "if in a pure race, characterized by a certain tendency to sterility, we allowed only brothers and sisters to pair, in a few generations the stock would become extinct." If animals closely related by blood pair, the number of their offspring is always less than the average.

In the case of the human species, however, the influence of the marriage of near kin in diminishing fertility cannot be regarded as definitely proved.

Occasionally the incapacity for ovulation and the sterility dependent thereupon are hereditary—paradoxical as this may appear. It is necessary to assume, that just as the sperm is at times unsuited for effective fertilization, so also the ova may be in a less or greater degree insusceptible of fertilization. In the present state of our knowledge, indeed, we are not in a position to be precise as to the exact nature of such incapacity. It is possible that the enveloping membrane of the ovum varies in its resistance to penetration, as Schenk claims to have proved in respect of certain of the lower

mammals. In his experiments on artificial fertilization outside the body of the mother, he ascertained that the cells derived from the discus proligerus, surrounding the ovum in immediate contact with the zona pellucida, are in some instances easily separable one from another, so that the spermatozoa can readily obtain access to the zona pellucida; whereas in other instances, in which the ovum is of the same size and apparently in the same stage of maturation as before, these cells remain closely attached each to the other, and thus prevent the passage of the spermatozoa. This condition of the ovum, so unfavorable to fertilization, may be hereditary in certain families, and its transmission may render certain members of the stock infertile.

Such instances as the following from my own practice are by no means rare. Of three sisters, whose family life was intimately known to me, one had one child only, a girl, whilst the two others remained childless. The girl of the second generation married and remained childless. In England it is well established that when, in cases of only-child-sterility, the offspring is of the female sex, this child will probably herself be barren. Galton found that in the case of 14 heiresses (*i.e.*, the only children of wealthy parents), all of whom were married, 8 remained absolutely barren, whilst of the others, 2 had each an only child.

It was formerly believed that when a woman gave birth to twins of opposed sexes, the female infant would prove to be barren, this barrenness being associated with defective development of her reproductive apparatus. John Hunter (*Animal Economy*) ascertained that in the case of twin calves of opposed sex, the genital organs of the female twin were almost invariably imperfectly developed. But the supposition that this is true also of the human species has not been

confirmed by experience. I know several married women who had twin brothers, and these women have borne normal children; however, the number of their offspring is remarkably small. Simpson, in Edinburgh, recorded the results of the marriage of 113 women who had been born with twin brothers; of these, 103 had proved fruitful, and 10 (*i.e.*, about one-eleventh of the whole) barren, although of these latter women, one had been married upwards of 5 years, and the remaining 9 for periods ranging from 10 to 40 years.

Simpson also gave the history of four women who were all the fruit of triple births, some of which had consisted of two boys and one girl, others of two girls and one boy. All four of these women were parous. Again, a woman who had been one of a quadruple birth (three boys and one girl), herself gave birth to triplets. A collection of all the figures accessible to me relating to this subject, indicates that about 10 per cent. of the women born in such circumstances prove barren—a ratio which corresponds closely with the ratio of infertility in general.

Sexual Sensibility in Women

In our consideration of the various influences by which the contact of ovum and spermatozoon may be prevented, the degree of sexual excitement experienced by the woman during the sexual act must not be overlooked, for this plays a part not to be underestimated, even though it is a matter on which it is difficult to obtain accurate information.

It is extremely probable that an active participation on the part of the woman in coitus has an important influence upon the attainment of fertilization, *i.e.*, that sexual excitement in the woman is a link in the chain of conditions leading to conception. This excitement

has a reflex influence, but the influence may be exercised in either (or both) of two ways: first, it may cause certain reflex changes in the cervical secretion, whereby the passage of the spermatozoa is facilitated; or, secondly, it may give rise to reflex changes in the vaginal portion of the cervix, to a rounding of the os uteri externum and a hardening of the consistency of the cervix (changes of an erectile nature) coupled with a slight descent of the uterus—changes which likewise favor the entrance of the semen into the uterine cavity. Theopold goes so far as to say that it is only women who experience erotic excitement who are capable of being impregnated.

My own opinion is that considerable importance is to be attached to voluptuous excitement of the woman during coitus, for the former of the two reasons mentioned above, namely, because such excitement leads to the occurrence of reflex secretion of the cervical glands, the secretion thus produced maintaining or enhancing the activity of the spermatozoa; and contrariwise, in the absence of voluptuous excitement on the woman's part there is a failure of the reflex secretion, and the passage of the spermatozoa into the uterine cavity is consequently less easily effected. That sexual excitement has great influence upon the production of the first appearance of menstruation, has frequently been shown; and an analogy between such an influence and the suggested effect of sexual excitement in favoring the occurrence of conception, must not lightly be rejected. It is well known that the first menstruation occurs at an earlier age in girls living in towns than in those living in the country; not solely (if at all) in consequence of the better nutriment and easier life of the former, but also, unquestionably, owing to nervous influences. It is, moreover, a familiar experience

that factory girls, who from early youth are exposed to sexual stimulation, attain sexual maturity at an extremely early age. Again, from early times it has been the prevailing opinion of the common people that for the impregnation of a woman it was necessary for her to experience voluptuous excitement, or at least, that in the absence of such excitement, conception was rendered difficult. Riedel relates of the indigens of the Island of Buru, that they often have sexual intercourse with foreigners, "but during such intercourse they remain quite passive, in order to avoid impregnation." It is not an unusual experience in gynecological practice for a sterile woman, in the absence of any prompting, to complain that during coitus she has no "feeling" whatever, and to attribute to this lack of feeling her failure to conceive.

A cultured lady, the mother of several children, assured me, not only that she was always aware whether an act of intercourse would or would not lead to impregnation, but, further, that it was within her power to determine whether the intercourse should or should not be fruitful. If she was passive during intercourse, or if, to use her own expression, her attitude was one of "*laisser faire, laisser aller,*" conception would not occur; but if, on the other hand, she took an active part in the coitus, so that she experienced a powerful voluptuous sensation, pregnancy would result from the intercourse.

In some cases, the previously described condition of dyspareunia is the cause of the sterility. In fact, the combination of dyspareunia with sterility is so strikingly common, that my own observations have led me to infer that there is a casual connection between the two states, at least in a considerable proportion of cases.

I append a short note of a few instances of this kind:

Mrs. G., aged 27, married 6 years, sterile; an anæmic, delicate lady, who has never experienced the sense of ejaculation. The semen flows away from the vagina immediately after the completion of coitus. No abnormality to be detected on gynecological examination. Mrs. S., aged 24, married 5 years, sterile; during intercourse remains completely cold, and has experienced the sense of ejaculation in dreams only. Gynecological examination disclosed the existence of slight cervical catarrh, but no other abnormality. Mrs. E., aged 30, married 10 years, had a child 9 years previously, a difficult delivery followed by puerperal disease, since then sterile; she states that since her delivery she has not experienced the sense of ejaculation, with which she was formerly familiar; further, since that time she has suffered from profluvium seminis. On gynecological examination the uterus was found to be enlarged and retroflexed. Mrs. K., aged 28, married 6 years, sterile; amenorrhœic, has never experienced the sense of ejaculation, and finds sexual intercourse so unpleasant that, "in order to be left in peace," she has herself begged her husband to keep a mistress. Examination showed the uterus to be in an infantile condition.

Whilst I have notes of numerous cases similar to those just quoted, I must also insist upon the fact that I have sometimes had complaints of dyspareunia from wives whose fertility has been proved by the birth of numerous children. And, again, anyone whose position permits him frequent glimpses of what passes behind the scenes of married life, will from time to time have noticed as signs of relative dyspareunia instances in which the faithless wife is far more readily impregnated by her lover than by the husband to whom she is indifferent or whom she actually dislikes.

To relative dyspareunia dependent upon sexual disharmony we must refer also those instances in which a man and a woman prove sterile while living together for a considerable period as man and wife, but after separation both prove fertile in fresh unions. Several such cases have come within my own experience, and similar instances attracted the attention of the observers of antiquity—Aristotle, for example. Haller, for this reason, lays stress on the lack of mutual affection as a cause of sterility; and Virey, also, believes that sterility may often depend upon the absence of the “harmonie d’amour.”

It is possible that the custom, which in certain rural districts has persisted into quite recent times, of a temporary experimental cohabitation of candidates for matrimony, was based on an attempt to discover the existence of such a sexual harmony. Ploss, for instance, reports that in East Prussia, in 1864, he was informed that among the Mazurs this custom of an experimental year of cohabitation was in force. If during this year the woman became pregnant, the young couple were married; but if pregnancy failed to occur, they separated, considering they were not formed for one another.

A well-known historical example of relative sterility is furnished by the two marriages of Napoleon I. His first marriage to Josephine remained sterile, though Josephine had children by Beauharnais; and Napoleon, remarried to Marie Louise, had a son by the latter.

Von Gutzeit, a physician of wide experience, points out that “sensitive women, who have a mental or physical antipathy to cohabitation, or who have a secret but ardent affection for some other man, often fail to conceive as a result of intercourse with their husbands; but when, in illicit intercourse, they experience the

voluptuous sensations to which they have hitherto been strangers, pregnancy often speedily ensues." He maintains, further, "that such women, in consequence of the stimulation of the genital organs in the absence of sexual gratification, become affected with all kinds of menstrual irregularities, with fluor albus, prolapse of the uterus, and chronic metritis; they suffer from digestive disturbances and constipation, leading to emaciation; and they are prone to hysterical manifestations."

Analogous phenomena have been noted, and with much greater distinctness, in the animal world. Darwin, writing on this subject, remarks: "It is by no means a rare occurrence, that certain males and females will not be fruitful in intercourse together, whilst the same individuals prove perfectly fertile in intercourse with other members of their species—and this in cases in which there is no evidence that the subsequent fertility is due to any change in the conditions of life. The cause is probably to be found in an innate sexual disharmony between the infertile pair. A very large number of instances of this kind have been reported to me by well-known breeders of horses, cattle, pigs, dogs, and pigeons. Sometimes a breeder will fail to obtain offspring from a male and a female of known fertility whom he wishes to couple for some special reasons. The most celebrated living horse-breeder informed me that frequently a mare, which in other seasons with other stallions has proved fertile, may be coupled with a stallion likewise of proved reproductive potency, and will fail to be impregnated; yet this same mare will shortly afterward be impregnated by another stallion."

Pflüger reports that he has often seen a thoroughbred stallion, which was fully prepared, at a moment's

notice, to serve a thoroughbred mare, prove extremely unwilling to serve a common mare on heat, and only induced to do so with the greatest difficulty, and indeed by a trick. The stallion is placed in the central one of three stalls, on one side of him is the thoroughbred mare, whilst in the third stall is the common mare, covered with a cloth. The stallion's head is turned to show him the thoroughbred mare; immediately his appearance undergoes a change. Every muscle of his body appears to quiver, and never does a fine animal appear more beautiful than at such a moment, full of pride, fire, and vitality.¹ As soon as the stallion makes ready to serve the mare, he is rapidly led to the other stall, and suitably assisted to the actual commencement of intercourse with the substituted mare. But it sometimes happens, as Pflüger himself has seen, that the stallion, becoming aware of the deception, refuses to complete the coitus, withdraws his penis, and immediately turns to the mare of his choice.

Matthews Duncan, among 191 sterile women, found that 39 had no sexual appetite, and 62 had no voluptuous sensations during coitus. He regards abnormal sexual appetite as one of the principal causes of sterility.

Notwithstanding these facts, it must not be forgotten that many cases are recorded in medical literature of

¹ Compare stanzas 46 and 47 of "Venus and Adonis":

His ears up-prick'd; his braided hanging mane
Upon his compass'd crest now stands on end;
His nostrils drink the air, and forth again,
As from a furnace, vapors does he send:
 His eye, which scornfully glisters like fire,
 Shows his hot courage and his high desire.

Sometimes he trots, as if he told the steps,
With gentle majesty and modest pride;
Anon he rears upright, curvets and leaps,
As who should say, "Lo! thus my strength is tried;
 And this I do to captivate the eye
 Of the fair breeder that is standing by."

women conceiving after intercourse effected against their wishes, as by rape, or when they were in a state of intoxication, or asleep, or in the entire absence of all voluptuous sensation. Moreover, the erection of the vaginal portion of the cervix, and the reflex movements and secretory changes in the uterus, may also occur independently of sexual desire and voluptuous sensation; but such cases are certainly exceptional, and their credibility is frequently open to suspicion. In numerous instances in which conception is stated to have followed intercourse in a state of unconsciousness, judicial proceedings have elicited the fact that the intercourse was not entirely involuntary on the woman's part, and that the alleged force was no more than a *vis grata*. Von Maschka reports a case in which a girl asserted that she had been violated whilst in a condition of epileptic unconsciousness, but she remembered every detail of the act with precision. Casper, again, in a case in which it was asserted that defloration had been forcibly effected whilst the girl was in a state of alcoholic coma, showed that there had been no more than moderate intoxication combined with great sexual excitement. Assertions that pregnancy has resulted from intercourse effected during sleep, in a state of unconsciousness, or in the "magnetic" or "hypnotic" state, should always be accepted with reserve.

It is interesting to note in this connection that the Chinese physicians enumerate among the causes of sterility the practice of "congfu" by the man, this name being given to a manipulation analogous to hypnotism, whereby the voluptuous sensation during intercourse is diminished or abolished by distracting the attention elsewhere.

A proof of the importance of specific sexual sensation for the attainment of conception is afforded by

the fact that in the majority of women voluptuous excitement is absent at the first act of intercourse, and only gradually develops thereafter; in correspondence with this, we find that the first conception does not usually occur until some time after marriage, and that the period of its occurrence frequently coincides with the full development of voluptuous sensation during intercourse. Thus, even in the woman fully fitted for conception, the actual capacity for impregnation is only developed gradually, and after a sufficient experience of intercourse.

This transient incapacity for conception may, indeed, also depend upon the fact that at first coitus is apt to be incompletely effected, and for this both husband and wife are to blame; but unquestionably in many cases the reason is the one first mentioned.

In some cases, certain psychical influences which affect the intensity of the voluptuous sensation, manifest its significance. Thus, in some instances, the influence of stimulation of the clitoris in leading to conception has been clearly shown; in others, the performance of coitus in some unusual position, varying with the woman concerned, is alone competent to arouse sexual sensibility to its full extent, and to bring about the orgasm. One occasionally receives confidential information from a husband that his wife experiences a voluptuous sensation only when coitus is performed in the lateral posture, or *more bestiarum*, or in the *situs inversus*, etc., etc.

Excessive frequency of intercourse, prolonged and repeated sexual excitement, on the other hand, induce sterility, as is well seen in prostitutes, who rarely become pregnant.

Finally, perverse sexual impulse must be mentioned as a possible cause of sterility. This may be an ac-

quired perversion, due to the fact that at the epoch of the menarche, the commencement of puberty, owing to the strength of sexual desire whilst intercourse is an impossibility, or simply from evil example, the girl has become a confirmed onanist, and continues the habit even after marriage. In other cases we have to do with a psychopathic state, a form of mental degeneration due to very various causes, or in some cases inverted sexual sensibility exists in a person whose mind is in other respects normal. In women with sexual inversion, ordinary copulation with the male is insufficient to arouse the sexual orgasm, and for this reason, as well as because persons thus affected avoid coitus as much as possible, sterility commonly ensues.

In sterile homosexual women, and equally so in women addicted to masturbation, gynecological examination may disclose no abnormality whatever; but in other cases of the kind we may find a contributory cause of sterility in the fact that the internal genital organs are imperfectly developed, or even completely absent. In sterile women, if on gynecological examination we find certain characteristic changes in the reproductive organs, a strong suspicion will be aroused that the sterility is due to abnormal modes of sexual gratification. The changes in question are: hypertrophy of the clitoris, enlargement and a bluish coloration of the labia minora, retroversion of the uterus, neuralgia and displacement of the ovaries, leucorrhœa, and menorrhagia.

The question has been mooted by Cohnstein, whether, as is commonly asserted, a woman is capable of becoming pregnant at any time during the year, or whether, as in the lower animals, the reproductive capacity can be exercised only at certain seasons, or again, whether there may not be individual moments

of predilection for the occurrence of conception. He found that in the great majority of women there were such seasons of predilection, and only in a minority could conception be effected indifferently at any time of the year. As a proof of this assertion, he appends the following case: A married woman, 33 years of age, had several years before been delivered prematurely of a stillborn child, and since then had not again been pregnant. Her reproductive organs were normal. The husband's semen was examined, and also found to be quite free from abnormality. In the course of the three following years an attempt was made to cure the sterility by dilatation of the cervical canal, suggestions for the proper regulation of sexual intercourse, etc., but all without effect. Cohnstein now calculated the date at which the full term of the previous pregnancy would have fallen, and found that this was the middle of February; he therefore inferred that intercourse effected at the beginning of May would result in impregnation. As a fact, the woman conceived at this time, and at full term gave birth to a healthy girl. The assumption that such a time of predilection for the occurrence of conception exists is, however, contradicted by the well known fact that in the case of large families the children's birthdays are irregularly distributed throughout the year.

Baker-Brown describes a special form of sterility due to "sympathetic or reflex action." It depends upon diseases of the organs adjoining the uterus, such as vascular tumors of the urethra, bleeding piles, fistula, fissure, and prolapse of the anus, schirrus of the rectum, ascarides. "These diseases produce sterility in consequence of the loss of blood, the menstrual disturbances, the morbid congestion of the uterine system, and the reflex neuroses, to which they give rise." Courty re-

ports a case belonging to this category in which in a young married lady sterility was due to fissure of the anus, which had long existed without recognition; after the fissure had healed, conception occurred. Palmay recently reported a case in which "tænia solium was the cause of sterility. In a woman 20 years of age, who had lived in sterile wedlock for three years, the presence in the intestine of a tapeworm, which she had harbored for many years, gave rise to dysmenorrhœal troubles. The complete expulsion of the worm relieved the dysmenorrhœa, the woman became pregnant, and gave birth to a child at full term; since then menstruation has been painless." The presence of the tapeworm may have had an unfavorable influence upon the blood-supply and the innervation of the uterus. But cases of this nature do not constitute a special form of sterility; they must be classed, either with cases due to interference with ovulation, or with those due to prevention of the contact of ovum and spermatozoon.

Incapacity for Incubation of the Ovum

The fertilization of the ovum is, as previously described, probably effected in man, as in other mammals, in the upper third of the Fallopian tube. The fertilized ovum is then swept down into the uterus by the action of the cilia which line the tube, assisted by the peristaltic movement of the muscular wall of the canal. The uterine mucous membrane at this time is thickened and thrown into folds, and in these latter the fertilized ovum is entangled; by its presence the ovum now exerts a reflex stimulus leading to a still greater proliferation of the cells of the uterine mucous membrane, which grows up over the ovum and soon shuts it off completely from the uterine cavity. Thus

the ovum comes to be entirely imbedded in the substance of the mucous membrane.

Thus for the implantation of the ovum, it is first of all necessary that the uterine mucous membrane should be in a normal condition; pathological changes in this membrane, and indeed any morbid structural alteration in the uterine tissues, may prevent the implantation and incubation of the ovum, and may thus give rise to sterility.

The uterine cavity is normally lined with ciliated epithelium, the cells of which have an elongated elliptical form. The movement of the cilia is directed downward. The epithelium is perforated by the orifices of the uterine glands; these glands are simple tubular glands, passing through the mucous membrane with an S-shaped or corkscrew curve; between the glands lies a rich germinal tissue, made up of rounded cells. The rounded connective tissue cells have processes which build up the scaffolding of the mucous membrane. Among the connective tissue cells of the uterine mucous membrane, wandering leucocytes are almost always to be seen. Menstruation is characterized by a swelling of the mucous membrane, and by enlargement of the uterine glands. At the same time, blood extravasations appear between the more superficial layers of the membrane, and on its free surface, and various portions of the surface of the membrane are cast off.

Very numerous are the morbid states of the uterus and its annexa whereby the implantation and incubation of the ovum are prevented; and incapacity of the uterus for the fulfilment of these functions is therefore a common cause of sterility in women.

That developmental defects of the uterus, even when they are not such as render conception impossible, may yet often give rise to sterility, has been already

explained in writing of the conditions of the uterus which prevent the contact of ovum and spermatozoon; for defects of development which are not sufficiently severe to prevent this contact, may yet suffice to render the uterus unfit for the implantation and incubation of the fertilized ovum. Inflammatory disorders, such as perimetritis and the formation of exudations in the parametrium, may render the uterus unable to undergo the enlargement necessary to pregnancy. Tissue changes in the uterine musculature may likewise prevent the implantation of the ovum, or the proper development of the uterus during pregnancy. New-growths of the uterus or its neighborhood may bring the development of the fertilized ovum to an untimely conclusion. Above all, however, it is diseases of the uterine mucous membrane which unfit the organ for the implantation of the ovum, and thus give rise to sterility. All those inflammatory states which lead either to softening or to induration of the uterine parenchyma, or to swelling and thickening of the endometrium or parametrium, may offer a hindrance more or less serious to the normal incubation of the ovum.

The diagnosis whether in an individual case we have to do with sterility dependent upon *impotentia gestandi*, is often difficult, because the conditions which cause it are frequently associated with those which cause sterility by preventing the contact of ovum and spermatozoon. In any case, a careful examination of the pelvic organs must be made, not only to determine whether there is any displacement or enlargement of the uterus, chronic metritis or perimetritis, parametric exudations, or new-growths of the uterus or of neighboring organs, but also, if necessary, by dilating the cervical canal, to ascertain the condition of the uterine

mucous membrane, and whether there is hyperplasia or atrophy thereof. In this connection, examination of the uterine secretion is of especial importance: a purely mucous, transparent, vitreous, tenacious secretion in the os and in the cervical canal, indicates the existence of catarrhal endometritis; a markedly hæmorrhagic secretion signifies hyperplastic endometritis; profuse purulent secretion containing gonococci, indicates gonorrhœal endometritis; the discharge of pieces of membrane shows that there is exfoliative endometritis; the discovery of fragments of carcinomatous tissue indicates the breaking down of a malignant tumor of this nature, etc.

Finally, it is necessary to obtain a careful history of the case, asking whether there have been menstrual irregularities, or miscarriages, and the characters of previous labors (in cases of acquired sterility); any pathological conditions in other organs should be investigated; and the condition of the blood and the state of general nutrition should receive attention. Chlorosis, anæmia, and scrofula often give rise to catarrhal endometritis; severe disease of the heart may lead to congestive troubles of the genital organs; after abortion or difficult labor, chronic metritis or endometritis are common. Further, the differential diagnosis between erosion and carcinoma of the portio vaginalis, must often depend upon consideration of the patient's age and general health, and upon the nature and duration of the hæmorrhage. Pain on micturition, appearing soon after marriage, and lasting often a few days only, will indicate the probability of gonorrhœal infection, etc.

Von Grünwaldt has vigorously insisted upon the fact that the notion of sterility, i.e., *impotentia generandi*

randi in women, is not coincident with the notion of *impotentia concipiendi*, and there is an important distinction between cases in which it is impossible that fertilization should be effected, and cases in which, though fertilization may take place, the implantation and incubation of the ovum fail to ensue. In this author's opinion, the only absolute mechanical hindrance to the entrance of the semen is to be found in atresia of the genital passage, and the rôle of *impotentia concipiendi* is of quite minor importance as compared with incapacity on the part of the uterus for the implantation and incubation of the ovum, an opinion, which, notwithstanding the record of exceptional cases in which pregnancy has occurred in spite of the existence of mechanical obstacles to conception, I must regard as altogether beyond the mark. On the other hand, it is indisputable that for the occurrence of pregnancy it is necessary, not only that contact of ovum and spermatozoon should be possible, but further, that the uterus should be in a condition favorable for the implantation and further development of the ovum subsequent to fertilization. For this reason, diseases of the uterine tissues must play an important part in the causation of sterility, though we cannot go so far as to admit with von Grünewaldt that these diseases are the *principal* cause of reproductive incapacity in women.

Various metritic processes, and also venous hyperæmia consequent upon heart disease, may lead to atrophy of the uterine mucous membrane, which then appears thin and smooth, whilst the uterine glands are destroyed, or transformed into small cysts. The same condition may result from retention of secretions in the uterine cavity—hydrometra and hæmatometra. In all these cases, the epithelium probably loses its cilia. The process has a serious influence antagonistic to the

reproductive capacity inasmuch as the implantation of the chorionic villi is rendered difficult (Klebs).

Hyperplasia of the uterine parenchyma, affecting either the whole organ or a large part, and characterized either by enlargement of the entire organ, or only by thickening and elongation of the cervix, may hinder the incubation of the ovum. It may be due to endometritic catarrhal processes; to venous hyperæmia, especially in cases of valvular heart disease; to subinvolution, and sometimes to excessive sexual stimulation, as in prostitutes. Both the change in the shape of the cervix, and the changes undergone by the uterine mucous membrane in cases of extensive uterine hyperplasia (it commonly becomes atrophic and discharges a watery secretion), interfere with the reproductive capacity.

In all cases of chronic metritis, the hyperæmia and hyperplasia of the uterus may give rise to hæmorrhages; these sweep away the ovum, and thus lead to *impotentia gestandi*. And the nutritive changes in the mucous membrane that occur in chronic metritis also interfere with the implantation and incubation of the ovum. Moreover, it is well known that in these cases, even if conception is effected, abortion is extremely apt to occur, owing to the pathological state of the endometrium, which interferes with the normal development of the decidua. Hæmorrhages occur in the decidua, and are followed by abortion. And further, the replacement of portions of the muscular tissue of the uterine wall by fibrous tissue, a change which is apt to occur in long-continued metritis, interferes with the proper expansion of the uterus during pregnancy, and thus leads to abortion.

On the other hand, it cannot be denied that frequently enough patients with well marked chronic metritis

nevertheless conceive in a normal manner, and give birth to a healthy child; and this not once only, but again and again.

As sterility due to mesometritis, von Grünwaldt classes the numerous cases in which sterility ensues upon a confinement in which the patient reports that inflammation followed delivery—or sometimes in which nothing abnormal was noticed. The results of local examination are negative: there is no displacement, no exudation or swelling, and no relevant affection of the endometrium. But the characteristic feature of these cases is, according to von Grünwaldt, that after her last full-time delivery, a woman has had a miscarriage or a premature delivery, and subsequently has been completely sterile. The degenerative process is at first partial, so that it does not prevent conception, but renders it impossible for the pregnancy to go on to full term; subsequently it extends throughout the mesometrium and conception is no longer possible.

Cole, of San Francisco, regards as the most frequent cause of sterility ensuing upon a single delivery, subinvolution of the uterus, most commonly due to rising too early after delivery. He therefore considers it of especial importance after a first delivery that the physician should satisfy himself that no serious injury has been effected by the process.

Chronic endometritis is a very frequent cause of sterility; in the first place, the catarrhal swelling of the mucous membrane, which often extends from the os uteri externum to the ostium abdominale of the Fallopian tubes, offers an obstacle alike to the downward passage of the ovum and the upward passage of the spermatozoa; and secondly, in long-standing cases, the large size of the uterine cavity and the smoothness

of the surface of the atrophied mucous membrane, render the lodgment of the ovum in the uterus very unlikely. A further powerful obstacle to impregnation in cases of endometritis is offered by the profuse muco-purulent secretion which usually, though not invariably, accompanies that disease. This secretion, in some cases flowing freely over the surface of the membrane, but in others adhering to it with tenacity, whitish-yellow in color, rendered cloudy by admixture of pus, or tinted red by admixture of blood, sometimes of a gelatinous consistency with a strongly alkaline reaction, contains globules of mucus, ciliated and cylindrical epithelial cells, pus corpuscles, bacteria and cocci—and, if the endometritis is of gonorrhœal origin, the gonococcus of Neisser. This secretion, when profuse and thinly fluid, pours out through the os, and sweeps away the semen; when tenacious and gelatinous, it fills up the dilated cervical canal above the constricted os uteri externum, and constitutes a powerful barrier to the upward passage of the spermatozoa; when purulent, it is destructive to the vital activity of the spermatozoa. The changes in the mucous membrane in cases of long-standing endometritis, whereby the uterus is rendered unfit for the implantation and incubation of the ovum, are the following. The epithelial cells, as usual in cases of continued catarrh, change in form, the ciliated cells disappear, and are replaced, first by cylindrical cells, later by polymorphic cells, approaching in type those of pavement epithelium. The mucous membrane is swelled, the vessels are dilated, there is hyperplasia of the glands, with a moderate amount of small-celled infiltration of the interglandular tissue. Ultimately the mucous membrane undergoes atrophy, its glands

disappear, and it comes to resemble a thin stratum of connective tissue.

Thus, in severe and long-continued endometritis, the changes that occur in the uterine mucous membrane render the implantation of the ovum and the formation of normal decidua impossible; even if conception does occur, the fertilized ovum is speedily discharged. Frequently, in cases of endometritis, there is consecutive displacement of the uterus which acts as a contributory cause of sterility. When endometritis lasts a long time, proliferation of connective tissue in the uterine parenchyma also occurs, leading often to hypertrophy of the cervix, and to stenosis of the cervical canal. Since in so many different ways endometritis may give rise to sterility, the importance that must be attached to this condition is evident.

The great significance of gonorrhœal infection in relation to sterility in women depends, not only on the changes this disease causes in the Fallopian tubes, leading to interference with the necessary contact of ovum and spermatozoon, but further, upon the occurrence of gonorrhœal cervical and corporal endometritis, of perimetritis, and secondary parenchymatous metritis. Still, under appropriate treatment, the inflammatory changes consequent on gonorrhœal infection are in many cases curable, and, after absorption of the exudations and restoration of the normal nutritive conditions of the tissues, conception may take place. Fritsch, who points out that in the woman infected with gonorrhœa, sterility ensues in a manner analogous to that in which it occurs in the male (for in the latter it is not the primary urethritis, the disease of the passage, but the secondary inflammation of the testicle that leads to sterility), states that he has observed cases in which beyond question conception has

occurred, notwithstanding the existence of gonorrhœal endometritis.

In my own experience, whilst gonorrhœal endometritis is, among inflammations of the endometrium, the most frequent cause of sterility, the place of next importance in this connection is occupied by exfoliative endometritis, or membranous dysmenorrhœa. This name is given to a pathological condition in which from time to time, usually during menstruation, fragments of membrane, or even an entire sac-like cast of the uterine cavity, are expelled from the uterus; since this condition is apt to hinder the incubation of the ovum, it is commonly associated with sterility—a fact mentioned already by Denman in 1790, and since then confirmed by numerous observers. I have had under observation several cases of dysmenorrhœa membranacea; in two cases it existed from the time of marriage—in one case 14 years, in the other 8 years—and in both sterility was absolute. In the latter of the two cases, vigorous treatment was undertaken, even curettage of the uterus, but quite without avail. In other cases, the sterility was acquired, the membranous dysmenorrhœa having begun after the woman had already had one or more children; but as I have never seen a case in which a woman became pregnant after the development of this affection, I am compelled to regard it as one of the most severe hindrances to conception.

As a general rule, exfoliative endometritis terminates only with the onset of the climacteric age; in very exceptional cases, however, a cure may take place earlier. In cases in which this premature termination has been observed, pregnancy has been known to ensue, cases of this nature having been observed by Sоловieff, Fordyce Barker, and Thomas. And recently,

cases have been reported, in which the disease has returned after such a pregnancy. Fritsch, indeed, is of opinion that exfoliative endometritis does not cause sterility, and that in this disease abortion is no commoner than in other diseases of the uterus. Charpignon, Hennig, and Bordier have also observed conception occur in the course of this disease. In 42 cases of membranous dysmenorrhœa collected by Kleinwächter, pregnancy occurred in four during the existence of the disease. Löhlein also reports that, among 27 patients affected with membranous dysmenorrhœa, six became pregnant, after the symptoms had been clear and unmistakable for a shorter or longer period. Two of these patients had been already pregnant before the first appearance of the exfoliative endometritis; subsequently they became pregnant and were delivered at full term. The other four had suffered for varying periods and with varying severity from the affection, before they first became pregnant. In three of these cases curettage of the uterus was performed; but in one only, in which pregnancy ensued very speedily on the operation, could a causal connection be inferred. In two of the cases the mothers of the patient had also suffered from the affection.

It has been asserted by B. Schultze and others that curettage of the uterus renders it difficult or impossible for pregnancy subsequently to occur. There is, however, no evidence to justify such an opinion.

Especial attention should be given to inflammatory process in the perimetrium and the parametrium as diseases giving rise to sterility in women. They are extremely common, and at times are so insidious, running their course without giving rise either to pain or to fever, that even when very extensive, and even when they have led to the formation of secondary

tumor-growths, they may yet be overlooked. Hence their pathological significance in the causation of sterility in women is still underestimated. Chronic pelvic peritonitis and parametritis may lead to the onset of sterility in various ways: changes may occur in the cervix, this organ becoming indurated, fixed and retroposed, and painful when the uterus is moved; inflammatory changes may affect the body of the uterus, the ligaments of the ovary, and various portions of the pelvic peritoneum; displacement of the uterus may occur; one or both ovaries or tubes may be dislocated and fixed, either to the side of the uterus, or behind it, in the pouch of Douglas; all kinds of adhesions or inflammatory nodules may result from these processes.

Further, in the scarred, contracted, sclerosed parametric tissue, the blood and lymphatic vessels of the parametrium are compressed, and in part obliterated, and the intimate connection between the pelvic cellular tissue and the uterus readily leads to the onset of endometritis, whereby the implantation of the ovum is interfered with. The occurrence of sterility in cases of pelvic peritonitis and parametritis, depends in part on the indirect effects of the inflammatory exudations, and in part on the direct result of the extension of the inflammation to other regions. The perimetritis, parametritis, and pelvic peritonitis that result from gonorrhœal infection have thus an especially disastrous influence, for the reason that in these cases cervical metritis and endometritis with blennorrhœa are commonly superadded. This is the principal cause of the almost invariable sterility of prostitutes, in whom, however, we must also take into consideration the influence of the absence of voluptuous sensation in an act which to them has become a mere matter of business.

The investigations of Bandl in the post-mortem room

show that residues of perimetritic and parametritic inflammation are to be found in the bodies of 58.4 per cent. of parous women, and 33.3 per cent. of the bodies of women (married or unmarried) who have had experience of sexual intercourse but have never had a child. This, he thinks, is the explanation of the great frequency of childless marriages and of relative sterility in women. In the nulliparæ mentioned above, Bundl commonly found an indurated, functionless, in places cicatrized, narrowed cervix, paraoöphoritic and perisalpingitic residues, and morbid changes in the tubes and the ovaries. In some cases also the husbands of such sterile women were found to be affected with azoöspermia. The connection between azoöspermia in men and the discovery of inflammatory residues in their childless wives, is a very intimate one. The husband at the time of marriage was suffering from an imperfectly cured gonorrhœa, and infected his wife.

In the other class of cases, in which the women had had children, and subsequently became sterile, the limitation of fertility depended chiefly upon inflammatory residues in and around the ovaries and the tubes. In the majority of such cases, pregnancy is not rendered impossible, but merely difficult, for, notwithstanding the presence of very extensive inflammatory residues, the tubes are often pervious, and the ovaries fully or partially functional. Therefore, even in cases in which intra-pelvic inflammation has been very severe, we must be cautious in giving a prognosis that pregnancy has been rendered impossible, for the cases in which both ovaries are imbedded completely in pseudo-membranes, or in which both tubes have been rendered impervious, are unquestionably rare.

Carcinoma of the uterus rarely causes sterility. In its initial stages, in which there is merely papillary

proliferation of the portio vaginalis, or carcinomatous infiltration of the deeper layers of the mucous membrane, no hindrance is offered to conception; but even in the later stages of the disease, when ulceration has occurred, and when there is extensive necrosis of the cancerous masses, there is not necessarily any absolute impossibility of the occurrence of conception, so long as cohabitation remains possible, and no insuperable hindrance has risen to the contact of ovum and spermatozoon. The cases are numerous in which pregnancy has been observed, notwithstanding extensive carcinomatous disease of the cervix, with necrosis of the tumor tissue; and Cohnstein even asserts, though in this he goes too far, that cancer of the cervix actually favors impregnation. Among 127 cases of this kind, there were 21 in which the disease had existed for a year or more before the occurrence of conception.

Winckel summarizes in the three following propositions his experience regarding the relation between uterine carcinoma and sterility: 1. Married women form the very large majority of those affected with carcinoma of the uterus. 2. The marriage of such women has very rarely proved sterile. 3. On the contrary, the women affected with this disease have generally been exceptionally fertile.

Other tumors of the uterus cause sterility, not merely by giving rise to mechanical interference with the necessary contact of ovum and spermatozoon, but also by leading to catarrhal states and hyperplasia of the mucous membrane, which interfere with the implantation of the ovum, even when fertilization has been effected. Uterine polypi give rise to mechanical obstruction of the os uteri externum or of the cervical canal; but they predispose to sterility in an additional

way, inasmuch as in a woman affected with such a new-growth any vigorous bodily movement is apt to cause profuse uterine haemorrhage.

In cases of myoma of the uterus, apart from the mechanical hindrances to conception imposed by these tumors, there is also interference with the implantation of the ovum. When numerous myomata have formed in the uterine wall, the mucous membrane is usually smooth and atrophied, and discharges a watery secretion, and for these reasons the imbedding of the ovum in the uterine cavity is rendered extremely difficult. But that there is often an additional cause of sterility in cases of myomata uteri, has been shown by the researches of Schorler, who examined 822 patients affected with fibromyoma of the uterus. He found that in most of those in whom sterility was observed, the tumors were not submucous but subserous, and that the sterility was to be explained in these cases by the frequent occurrence of partial peritonitis, with its evil results to the uterine annexa.

Schorler appends the following table:

	Sterile.	Percentage.
Of 85 women with interstitial myoma.....	21	24.7
Of 92 women with subserous myoma.....	44	47.8
Of 18 women with submucous myoma.....	7	38.8
Of 44 women with polypous myoma.....	4	9.0
Of 14 women with cervical myoma.....	3	18.7
<hr/>		
253	<hr/>	<hr/>
	79	31.2

When there are polypous new formations in the uterine cavity, even if conception occurs, abortion follows, for the reason that the rupture of the hypertrophied capillaries in the growths themselves and in the neighboring tissues, prevents the normal development of the embryo. Horwitz has, however, described a case in which pregnancy went on to full term, notwithstanding the existence of growths of this nature.

Owing to the frequency with which chronic metritis and endometritis ensue upon parturition, it can readily be understood that delivery itself is often the primary cause of subsequent sterility. A temporary sterility often follows the first delivery. It is well known that the birth of boys is in general more difficult than the birth of girls. Pfankuch, collecting information regarding the first and second deliveries of 300 married women, ascertained that after 166 of the first deliveries in which boys were born, the average lapse of time to the second delivery was 30.2 months, whereas after 134 of the first deliveries in which girls were born, the average lapse of time to the second delivery was only 27.4 months.

The importance of previous delivery in leading to sterility, in consequence of mesometritis and diffuse connective tissue hyperplasia of the uterus, is shown by von Grünwaldt, who published the following figures as a result of his investigations. Of 56 women affected with chronic metritis, 46.4 per cent. were sterile; in 19.2 per cent. of these the sterility was congenital, in 80.7 per cent. it was acquired. Of 134 women suffering from myometritis and its consequences, 71.6 per cent. were sterile; in 17.7 of these the sterility was congenital, and in 82.2 per cent. it was acquired. On the other hand, of 321 women suffering from endometritis, 29.5 per cent. were sterile; in 28.4 per cent. of these the sterility was congenital, and in 71.5 per cent. it was acquired.

Lier and Ascher also insist upon the importance of puerperal diseases in the causation of acquired sterility, basing their opinion upon Prochownick's clinical material. They draw, however, the following distinction. If the puerperal infection takes place by way of the external organs of reproduction, through

the vagina to the cervix and thence to the connective tissue of the pelvis—the most common form, that which occurs soonest after delivery, and the most severe in its course—the women thus affected are likely soon to become pregnant again; if, on the other hand, the disease is pelvic peritonitis, the exciting cause of the inflammation proceeding from the interior of the uterus through the Fallopian tubes to reach the peritoneum, in the majority of cases the women thus affected will prove sterile for a long time or in perpetuity. In almost all the cases in which sterility resulted, the pelvic peritoneum had been severely affected by the puerperal inflammation. Regarding sterility in women, the two following general propositions are laid down by Lier and Ascher: 1. Hardly any single cause of sterility in women is so severe as to be competent by itself to render sterility inevitable throughout the period of sexual maturity, with the exception of defects of development and premature cessation of sexual activity. 2. Most of the hindrances to conception in women depend upon affections of the internal superficies of the reproductive organs, from the vulval mucous membrane upward to the pelvic peritoneum; of these, the most important are affections of the endometrium.

On the other hand, it must not be forgotten, that the general tendency of a previous delivery is to increase the capacity for impregnation. Olshausen especially insists upon the well-known gynecological fact, that as a result of the first delivery, there occurs an enlargement of the os uteri, which facilitates conception throughout the remainder of the period of sexual maturity. This is well shown by the not infrequent cases in which sterility persists for several years after marriage, and then, with or without artificial aid, the

first pregnancy occurs; thereafter one child after another appears in rapid succession.

Spiegelberg has pointed out that cervical lacerations may give rise to sterility by interference with the incubation of the ovum. Olshausen maintains that this affection is liable to cause abortion, for the reason that by the gaping of the cervical canal the inferior pole of the ovum is from time to time exposed, and this gives rise to reflex contractions of the uterus.

Von Grünwaldt publishes figures in support of his opinion that disturbances of the integrity of the uterus, whereby the implantation and further development of the ovum are interfered with, play on the whole a greater part in the causation of sterility than the various conditions previously described which interfere with contact of ovum and spermatozoon. But in this, we think, he goes too far.

Finally, in this connection, must be mentioned among the hindrances to fertilization, sexual excesses, such as are so common during the first weeks of married life. Too frequent coitus gives rise to enduring congestion of the uterus, and hence to an irritable state of the uterine mucous membrane, whereby the implantation of the ovum is rendered difficult. In prostitutes chronic metritis, due to the excessive frequency of intercourse, may be a contributory cause of the sterility which is almost invariable in these women; doubtless, however, the principal cause of their sterility is gonorrhœal perimetritis.

As a variety of the third kind of sterility, sterility due to incapacity for implantation or further development of the ovum, must be classed the cases in which, though conception and implantation of the ovum are known to occur, and the first stages of development of the embryo certainly take place, the woman proves

incapable of giving birth to a viable infant. Some of these cases depend upon abnormal modes of development, myxoma of the chorion and the like. In rare cases, women abort every month, discharging every four weeks a fully developed decidua vera, in which sometimes no trace of ovum can be detected. But this monthly abortion ceases as soon as marital relations are interrupted.

It would be passing beyond the scope of this work to discuss the pathological processes which lead to premature interruption of the pregnancy, after conception, implantation of the ovum, and the first stages of development, have occurred in a normal manner—to discuss, in short, the causes of abortion. Moreover, these pathological processes are outside the concept of sterility. It is sufficient here to enumerate the principal conditions in which abortion occurs. They are: various tissue disorders of the uterus, chronic hyperæmia of the mucosa, displacement of the uterus with fixation, parametric and perimetrical exudations, laceration of the cervix with ectropium; further, various constitutional disorders, such as the specific fevers, acute infective processes, chronic circulatory disturbances consequent upon cardiac, pulmonary, renal and hepatic disease, syphilis, anaemia, chlorosis, diabetes, etc.

Only-Child-Sterility

Until recently, only-child-sterility had received attention in England only, for the reason that it is comparatively common in that country; but this form of relative sterility is by no means rare either in Germany or in Austria. I had a collection made in Austria of the number of children resulting from 2,000 fruitful unions, and found that among these there

were 105 marriages in which one child only had been born; thus the ratio of these marriages to those which proved fully fruitful was about 1:19. But the figures are untrustworthy, since abortions and deaths in infancy were not taken into account. Ansell found that in England, among 1,767 fruitful marriages in which the mean age of the wives at marriage had been 25, there were 131 cases of only-child-sterility, giving a ratio of the latter to the fully fruitful unions of 1:13.

This form of relative sterility, in which the wife gives birth to one child, and thereafter remains barren, was referred by Matthews Duncan, either to a premature exhaustion of the reproductive capacity, the general bodily powers remaining unaffected, or else to a simultaneous weakening of the sexual powers and of the constitutional force in general. This explanation is a very inadequate one. The significant fact upon which an understanding of the nature of only-child-sterility must be based, is that the first delivery is the one which entails the greatest dangers to the mother, and that the subsequent sterility is attributable to the difficult delivery, and to the illnesses that follow in its train. In fact, only-child-sterility is observed chiefly after difficult deliveries, followed by long enduring inflammatory processes of the uterus and the uterine annexa, which seriously affect the woman's reproductive capacity. It occurs especially in delicately organized, anaemic, scrofulous women, whose powers of resistance have been undermined by a single pregnancy and parturition. Finally, it is met with in women suffering from myoma uteri, a form of tumor which beyond others renders the recurrence of pregnancy difficult and unlikely. This form of sterility has been seen also in cases in which compara-

tively soon after the birth of her first child, the mother has suffered from typhoid, scarlatina, or some other severe infective fever, which appears in some way to interfere for the future with the development of normal ova. We must also take into consideration the fact that at the time of the wife's first confinement, when the love which brought about the union has often already begun to diminish in intensity, the husband, finding too irksome the continence enforced upon him by his wife's condition, is not unlikely to go elsewhere for temporary sexual gratification, and to acquire a venereal disease, which he subsequently transmits to his wife, and which is responsible for the latter's future sterility. And we must not forget to take into account the adoption of means for the prevention of pregnancy after the first child has been born.

Again, I saw three cases of only-child-sterility in which the husbands were respectively 24, 26, and 29 years older than their wives, and in these instances no profound search was needful for the discovery of the cause of the wife's unfruitfulness; it was obvious that in each case the elderly husband's reproductive powers had sufficed for the procreation of a single child, but had then been completely exhausted. My experience in the mysteries of sterility in women has informed me of yet another cause of only-child-sterility, met with in cases in which the only child was born after several years of unsuccessful marital intercourse. In most of these cases, the wife has finally been impelled to seek a substitute for her husband, whose reproductive powers have proved insufficient; having succeeded in obtaining the child she desires, the wife does not again wander in strange pastures, and consequently remains sterile.

According to Kleinwächter—who gives a somewhat wider significance to the term “only-child-sterility,” including as he does cases of premature interruption of the first and only pregnancy, since these even more frequently entail permanent sterilization—only-child-sterility is by no means rare. Among 1,081 gynecological cases, he observed it in 90, that is, in 8.32 per cent. of the cases. In these 90 cases, there were 69 instances in which the sterility ensued upon full term delivery, and 21 instances in which it followed abortion or premature delivery. Kleinwächter, moreover, on the basis of his personal experience, supports my view of the importance of the sterilizing influence of the first delivery; but he has been unable to determine whether early marriage has any influence in the production of only-child-sterility.

Lier and Ascher also class as instances of only-child-sterility those cases in which a woman has had a single miscarriage, and subsequently remained sterile, since by this miscarriage the capacity of the woman for impregnation has been proved, and the question of capacity for full-term delivery has nothing to do with that of capacity for conception. As causes of this form of sterility, they lay especial stress upon puerperal infection, gonorrhœal infection, perimetritis, tubo-ovarian tumors, etc.

III

SEXUAL EPOCH OF THE MENOPAUSE

THE MENOPAUSE

That time in a woman's life at which her sexual activities come to their natural termination, marked by the cessation of menstruation, is known as the menopause, climax, or climacteric period.

This "change of life," from a condition of sexual maturity to a condition of quiescence of sexual functions, is not a sudden one, the symptoms of sexual retrogression making their appearance gradually, until the cessation of the monthly recurring menstrual flow indicates that the termination of sexual activity has arrived, and that sexual death is taking place.

The influence of this period of life is not manifested by the sexual organs alone—in these latter indeed various changes may be detected already before the cessation of menstruation, whilst after that cessation the atrophic changes characteristic of old age proceed in these organs with a slow but continuous advance—but the disturbances evoked by the climacteric involve the entire organism and affect the functions of numerous organs, giving rise to a true storm of irritant phenomena, and to manifestations of decay of manifold nature.

The stormy manifestations, the occurrence of which led the ancients to denote this period as the "critical age" of a woman's life, are in the first place due to changes in the ovaries; the tissue changes in these

organs give rise to a powerful ovarian stimulus, which, by irradiation and reflex action, leads to the occurrence of a number of nervous disturbances, vaso-motor manifestations, and circulatory disorders; whilst owing to the cessation of the internal secretions of the ovaries, numerous and intense pathological disorders of metabolism arise. These various symptoms become apparent at the very outset of the menopause, when the oncoming entire cessation of menstruation is already foreshadowed by irregularity in the periods, gradual diminution in the quantity of the flow, and variations in the number of days during which the flow on each occasion persists.

The manifestations of the menopause are in fact so striking, that from ancient times down to the present day a widespread belief has prevailed that especial danger to a woman's life is threatened by the climacteric age. The statistics available on this subject are, however, of dubious significance. Although it cannot be denied that the changes in the entire organism which attend the extinction of sexual activity bring numerous dangerous influences into play, yet I feel bound to maintain that these dangers are by no means so great as those which are involved by the sexual life in its ripest period of development—the dangers of pregnancy, parturition, and the puerperium.

It is often asserted that in this "critical period" of the menopause the mortality of the female sex is notably increased. The data available are somewhat conflicting, but a careful examination leads us to believe that, if due allowance is made for the natural increase in mortality with advancing years, no important increase in the mortality of women can be traced as due to the troubles and disturbances of the climacteric period.

The age at which a woman's last sexual epoch begins is a very variable one. The duration of the "change of life," the length of time during which the occurrence of the "change" is manifested by local and general disturbances, also varies greatly. Not less variable are the intensity and the general distribution of the symptoms which mark the climacteric.

The external configuration of woman at the climacteric age is usually characterized by signs of overripeness, and these changes appear to exercise upon certain men—more especially very young men—a peculiar kind of erotic stimulus. Many women remain long at this period quite fresh looking, with a vivid, youthful coloring; others, however, early manifest alterations in their finer feminine characteristics, hairs, for instance, sprouting on the chin, and the voice becoming deeper in tone.

The outward characters of senescence, with withering of the tissues, are not commonly manifested at this time, but first make their appearance in later years, after the completion of the menopause.

A tendency to the excessive accumulation of fatty tissue is one of the most distinctive characteristics of the menopause, varying, however, greatly in degree according to race, family predisposition, and nutritive conditions. The dominant tone is thus given to the physical configuration by the deposit of fat. The face comes to have a rounded, spherical appearance, the eyes looking smaller in proportion, whilst the furrows and folds which form the natural boundaries between the features become indistinct. The formation of the "double chin," and the abundant deposit of fatty tissue in the supraclavicular region gives to these extremely obese women an appearance of such a shortening of the neck that head and thorax seem to be

connected, as it were, by a great mass of fat, marked by furrows in the thyroid and subhyoid regions. The breasts sometimes attain an enormous size, hanging down to the gastric and even to the umbilical region. The abdomen is greatly enlarged, the fat in the anterior abdominal wall projecting more especially in the hypogastric region, hanging down in two or three horizontal rolls over the tops of the thighs, and pushing the mons veneris downward, so that this latter itself projects over the genital fissure. The posterior projection of the buttocks is also greatly increased, until they form a huge elastic cushion, of which the sensual Orientals, who regard obesity in women as a beauty, poetically write: "Her face is like the full moon, and her buttocks are like two pillows." Occasionally, so huge a mass of fat forms beneath the tuberosity of the ischium that the configuration of the nates reminds us of the well-known *steatopyga* or fat-rump of the Hottentot and Bosjesman women. In the genital organs, as already mentioned, the genital fissure is hidden by the projection of the mons veneris. The labia majora are also greatly enlarged by the deposit of fat, so that they look like two great cylinders lying side by side. Another way in which the characteristic sexual beauty is often lost in extremely obese women is by the falling out of the pubic hair.

Moreau, in his work on *The Natural History of Woman*, describes the changes occurring in a woman at the climacteric in similar terms, and concludes: "The only elements of a woman's beauty that may sometimes be saved from the wreck, to persist for a shorter or longer time after the climacteric, are, the abundance of her hair, the vivacity of her glance, and sometimes also the amiable expression of her countenance; gradually, however, even these last remnants

of beauty disappear, and old age takes possession with its irresistible force."

None the less, some women may preserve substantial elements of beauty for a long time after the menopause. A classical example of this fact is furnished by Ninon de l'Enclos. When she died, at the age of 90, she was still beautiful. At the age of 65 she aroused the passionate love of a young man, who, unfortunately, was her own son. When informed of this, he committed suicide. A young abbé fell in love with her when she was 75 years old.

The psychical life of woman is profoundly affected by the stormy physical changes of the climacteric. Not merely does a woman entertain the disturbing thought that the critical age has begun, bringing in its train certain dreaded dangers to her health and even her life, but she is further depressed by the consciousness that she is about to lose her feminine attractions, and to decline in sexual esteem, and that her reproductive capacity is now to be extinguished. She realizes vividly that the beautiful past, the loving and beloved womanhood, is now to be left behind forever, and by this an intelligent and sensitive woman cannot fail to be profoundly affected. Her feelings at this time were never more characteristically expressed than by the Frenchwoman who said "Autrefois quand j'étais femme." If, indeed, a woman has been so fortunate as to have made a happy marriage, to have borne healthy children, and to be living a satisfactory family life, she will be enabled to bear with comparative equanimity the disappearance of her sexual life; but it is different with the childless wife and with the unmarried woman, who, at the onset of the climacteric, must bury all their sexual aspirations, and who see the remainder of their lives stretch before them without

hopes for the future. The psychical predisposition and the intellectual education of the woman concerned will now determine whether she will bear the onset of the menopause with composure and resignation, or whether she will become a prey to melancholia. Women of the former kind will seek to find employment for the powers set free by their sexual non-activity in services of neighborly affection, in works of benevolence, and in the performance of social duties; women less happily endowed will display their hostility to the world in ill-nature, scandal-mongering, and intrigue, thus giving vent to their inward bitterness; while those, finally, with hereditary predisposition to nervous degeneration, will become the prey of veritable psychoses.

A by no means rare result of the excited fantasy and of the eager desire not to grow old, is displayed at the climacteric in the form of self-deception. The women thus affected cannot understand, and cannot be made to believe, that the cessation of menstruation is the natural sign of their sexual decadence, they trick themselves into believing that in their case it is a sign that they have become pregnant. We must not indeed forget that the enlargement of the abdomen, so common at the commencement of the climacteric, in association with the unexpected failure of the menstrual flow to appear, the frequent dyspeptic troubles, and the enlargement of the breasts in consequence of the deposit of fat in these organs, often enough lead to appearances which have a deceptive resemblance to the clinical picture of early pregnancy. The mistake is the more readily made because the breasts sometimes secrete a serous fluid, while sacrache is not infrequent, and peristaltic movements of the intestines are mistaken for the movements of the fœtus. Cases of this

kind, in which all the objective signs of pregnancy appear to be present, and in which it is impossible to convince the woman that she has been deceiving herself, and that all the signs and symptoms are due to the menopause, are mentioned already by very early writers, and have been frequently reported by modern gynecologists. [An example of spurious pregnancy, especially familiar to English readers, is that of Mary I, Queen of England.—TRANSL.]

Sexual desire in woman by no means reaches its physiological term with the climacteric and the cessation of menstruation. On the contrary, we have observed it to be the rule that shortly before and at the commencement of the climacteric there is a considerable increase in the libido sexualis, and at the same time an increase in sexual sensibility during coitus. This sexual erethism makes its appearance in a manner often extremely surprising to the husband—and especially surprising in the case of women who have previously been characterized by a certain frigidity in sexual matters, and who have, perhaps, always needed strong persuasion before they would consent to perform their marital duties. It is by no means rare for the increased sexual impulse to manifest itself in some pathological form. Even some time after the menopause, when senile changes in the genital organs are far advanced, the sexual impulse may still be remarkably active. There is an interesting analogy in the fact that Glaevecke observed that the sexual impulse was persistent in women in whom an artificial menopause had been induced by oophorectomy; and that Lawson Tait and L. Smith have reported cases in which dyspareunia, which had existed prior to the operation, passed away after the removal of the ovaries, so that after the artificial menopause, voluptas

cœundi for the first time made its appearance. Other authors, Goodell, for instance, report that libido sexualis is retained only for a short time after oophorectomy, but subsequently disappears, as in the course of the physiological menopause, and that at the same time the voluptas cœundi is entirely extinguished.

When the menopause is fully established, and the processes of involution in the reproductive organs have taken place in a normal manner, the woman has had time to acquiesce in the inevitableness of the changes that have occurred, and she often attains a state of emotional repose which was quite unknown to her in the earlier phases of her sexual life. More particularly those women, who hitherto during menstruation, and for some days before and after the flow, have been the prey of numerous nervous symptoms and troubles, rejoice, after the menopause, at their new-won freedom from these pains and disquiets, at their delivery from the excitements of the reproductive system, at their now uninterrupted state of well-being.

I once saw a group of statuary by Pietro Balestra, entitled "Time carries off Beauty." A beautiful woman was striving in vain to resist the overwhelming might of Chronos, whilst Cupid, about to be abandoned, was standing sorrowfully by. Here we have a symbolic representation of the sexual epoch of the menopause.

In a recently published romance, "Les Demi-Vieilles," Yvette Guilbert has described in a manner most true to nature the feelings of the "Half-Old," the mental condition of women at the climacteric, "They endeavor to remain young, to hide their defects, they seek once again the intoxication of love. But that which aforetime in hours of depression they have foreseen, now becomes a dreadful reality. When the

lemon has been squeezed dry, the skin is thrown away."

Sooner or later, after the completion of the menopause, the signs of senile marasmus become apparent. The soft, feminine configuration of the face disappears, the features become coarser, approaching the masculine type, hairs appear on the upper lip and on the chin. The voice becomes deeper and harsher. As decrepitude begins, the breasts wither, a change that occurs sooner in proportion to the degree in which their functions have been in previous years exercised by suckling; but also sometimes after a life of complete sexual inactivity. Even in cases in which the loss of substance of the breasts is apparently small, the glandular tissue of the organs has really disappeared, and has been replaced by fat. In advanced age, the breasts become quite small, wrinkled, flaccid, and dependent, and sometimes atrophied to become mere cutaneous folds. The nipples project more prominently, they are darker in color, and their surface is wrinkled. In the genital organs, the fat disappears from the mons veneris, which becomes flattened, whilst the pubic hair ceases to be curly, and much or all of it is ultimately shed. The labia majora become thin and flaccid, until they are mere empty folds of skin; they are widely separated, so that the vaginal orifice is closed only by the withered nymphæ, until these latter are themselves ultimately indicated by mere traces.

Where the menopause has been artificially induced, the signs of senescence do not appear immediately after the removal of the ovaries; their development is a very gradual one. The sexually mature woman, from whom these tokens of femininity have been removed, experiences at first little change in external configuration, beyond a somewhat exaggerated ten-

dency to the deposit of fat; the other changes described do not usually set in until the physiological climacteric age is attained. A few cases only have been observed in which after oophorectomy a rapid change to the masculine configuration has been observed.

Seldom if ever does it happen that menstruation suddenly ceases without any notable constitutional disturbance, so that in a moment, as it were, the menopause is effected, without any period of transition. Rarely, even, do we meet with cases in which the peculiar manifestations foreshadowing or accompanying the cessation of menstruation last for no more than a few weeks. Most commonly the irregularities of the menstrual function (of which the most noteworthy characteristic has hitherto been its extreme regularity), and the associated symptoms of the climacteric period, endure for months, and occasionally for years. According to my own observations, the mean duration of the climacteric manifestations is from two to three years, the limits of variation in individual cases being, however, exceedingly wide.

The manifestations which accompany the cessation of menstruation are, as a rule, the following: The woman is for some months in an irritable condition, complains of digestive disturbances, constipation, meteorism, epistaxis, haemorrhoidal flux, congestions of the head, increasing fugitive sensations of heat (Ger. *fliegende Hitze*), and a tendency to profuse perspiration.

The length of the intermenstrual interval commonly increases, to as much as six or eight weeks; the flow itself becomes scantier. In other cases, however, the flow becomes much more abundant, and the intermenstrual intervals much shorter than normal. In some cases, the regularity of the flow is altogether lost, it

appears now soon, now late, and is now scanty, now profuse. Sometimes the intervals are several months, it may be 6, 8, and even 10 months, then again the flow will occur every two or three weeks; in exceptional cases, a scanty flow persists right through what should be the interval, so that menstruation becomes continuous, with periodic increases in the flow. Not infrequently, after a sudden cessation of the flow, lasting for many months, menstruation recurs, and continues at regular intervals for a long time, until the final cessation of menstrual activity.

The mode of cessation which is most favorable to a woman's general health is for the duration of the intermenstrual interval gradually to increase, while pari passu with this increase, the amount of the flow progressively decreases, until it ceases altogether. In such cases, the general constitutional disturbance is reduced to a minimum. On the other hand, the *sudden* cessation of menstruation gives rise to profound disturbance of the domestic economy of the feminine organism, and causes violent changes therein. But even the gradual cessation of menstruation causes notable disturbance of the woman's mental and physical equilibrium, if the irregularities in the menstrual process are very great and spread over a very long period—more especially when the loss of blood is extensive.

Even after the menopause, after the final termination of the flow, there persists a more or less regular recurrence of certain symptoms referrible to the continuance of ovulation. Sacrache, a sense of abdominal tension, a feeling of heat and fulness in the pelvis, dragging pain in the hypogastrium, and general irritability, occur at intervals, so that the woman thus affected sometimes describes herself as suffering from the continuance of a "bloodless menstruation."

The two principal dangers of the climacteric period in women are, first, the great tendency to profuse uterine haemorrhages, and, secondly, the liability to the occurrence of malignant tumors, more especially to carcinomatous disease of the ovaries, the uterus, and the mammae.

With regard to the question whether, in any particular individual, the course of the menopause is likely to be favorable or unfavorable, there are, in my experience, four considerations of principal prognostic significance: the condition of the woman during the menarche, the state of the general health at the time of commencement of the menopause, the degree to which the sexual functions have been and are being exercised, and the manner in which the cessation of menstruation takes place.

As a rule, the disturbances and pathological states of the climacteric period will be especially frequent and severe in women whose sexual development at the time of the menarche was accompanied by severe disturbances of the general condition. In every individual there appears to be a certain connection between the manifestations attending the menarche and those attending the menopause, of such a nature that according as puberty has been passed through with little or with much disturbance of the general condition, a similar favorable or unfavorable course of the menopause may be prognosticated. If, at the time of the menarche, there were severe nervous manifestations, or heart troubles of a serious kind, the passage of the menopause may be expected to give rise to neuropathic affections and to cardiac disturbances in a similar manner.

The woman's state of general health is likewise of importance in determining whether the course of the

menopause will be favorable or unfavorable. Perfectly healthy women, with a quiescent temperament, and in favorable circumstances of life, will pass most easily through the climacteric period without disturbance of their general condition. Every departure from normal health has an unfavorable influence upon the course of the climacteric. In women of a plethoric habit of body, there is an especial tendency at this time to the occurrence of symptoms of stasis and hyperæmia. Chlorotic and anaemic women are more prone than others to suffer at the time of the menopause from uterine haemorrhages. Women of a sanguino-erethistic constitutional disposition often manifest at this epoch a tendency to neuroses and psychoses. Those women have the best prospect of a smooth and undisturbed passage through the climacteric age who enter upon it in a state of perfect health. Less favorable is the prognosis in the case of those women who already some time before the climax, at the outset of the fourth decade of their lives, have begun to complain of severe haemorrhages and various other pathological states.

Regarding the influence which the sexual activity of a woman during the menacme exercises upon the course of the climacteric, it may be said, generally speaking, that a previous free exercise of the sexual functions in normal conditions has a favorable influence upon the state of health during the menopause. Women who have been married for many years, who have had many children, and who have suckled these children, pass through the changes of the climacteric much more easily than old maids, than women who have lived for many years in continent widowhood, or than women who have had very few children or none at all. The practice of prohibitive coitus, i.e., the use

during intercourse of methods of preventing the occurrence of conception, a form of sexual immorality which has become extraordinarily common during the last few decades, has an unfavorable influence upon the course of the climacteric. Unfavorable, also, is the effect of great sexual activity during the four or five years immediately preceding the menopause. Women who marry shortly before the commencement of the climacteric, and those who have given birth to a child shortly before this time, commonly experience very severe disturbances during the menopause. Prostitutes who continue the active pursuit of their profession until the climacteric age have at this time much to suffer. Women who have had difficult deliveries, or several miscarriages, or severe puerperal illness—and indeed, speaking generally, those women who have been subject to any kind of disease of the reproductive organs—are apt to suffer from serious disturbances of the general health during the climacteric period.

The mode in which the cessation of menstruation takes place is also causally connected with the easy or difficult course of the menopause. Premature cessation of menstruation, or very sudden interruption of this function, has a deleterious effect, manifesting itself both by local disorders of the reproductive organs, and by general disturbances in the nervous system and in the circulatory organs. On the other hand, a late menopause and a gradual cessation of menstruation are both usually accompanied by a favorable course of the climacteric phenomena.

The influence of sexual activity upon the course of the climacteric is described by Busch in the following terms: "Women who have led an exhausting mode of life, who have had intercourse too frequently, those who have been given to onanism or to some other sex-

ual irregularity, and who therefore enter upon the menopause with flaccid and deteriorated reproductive organs, are liable to hæmorrhagic and mucous fluxes, to prolapse, carcinoma, dropsies, enlargements, and suppurative processes. Women, on the other hand, who have lived a life of strict isolation, and who have forcibly repressed all sexual inclinations, frequently suffer from ossifications, indurations, and atrophic conditions of the reproductive organs, and also from neoplasms."

After an artificial menopause, induced by the operative removal of the ovaries, similar manifestations occur to those witnessed during the natural menopause. Similar disturbances and troubles occur in both cases, but in the artificial menopause they are commonly more severe than in the natural; they last also for a longer time, varying usually from three to six years; moreover, in the artificial menopause, as in the natural, the disturbance of health is more severe and lasts longer in proportion to the youth of the individual. Further, in the artificial menopause also, the intensity and the duration of the climacteric manifestations are influenced by the constitutional state and by the condition of the genital organs at the time when the operation is performed. We note, moreover, that, just as in the physiological menopause, the attendant troubles are most violent in the initial period, and then gradually subside, so also after the induction of an artificial menopause by the removal of the ovaries, the resultant disturbances rapidly increase in severity, to attain their maximum in from three to six months, and then, after lasting for a year or so, they gradually become less severe, until they are ultimately extinguished.

The extensive process of transformation which goes on in a woman's system during this period of the sex-

ual life, from the very first diminution in ovarian activity to the complete extinction of the reproductive functions, manifests itself throughout the organism by means of a series of changes which can for the most part be referred either to states of blood-stasis and their consequences—congestion of various organs, haemorrhages, and disorders of secretion—or else to perversions of nervous function.

The most manifold symptoms of disordered circulation may occur: hyperæmic states of the central nervous system, flushings of the face, the so-called fugitive heats (Ger. *fliegende Hitze*), a tendency to epistaxis, to haemorrhoidal flux, and to profuse perspiration. The changes which take place in the reproductive organs at the time of the menopause give rise to venous engorgement and to collateral congestions. Such a condition of venous hyperæmia may occur in the gastric and the intestinal mucous membrane, giving rise to various dyspeptic manifestations, and at times, when severe, even to actual gastric and intestinal catarrh. Hyperæmia of the liver may also arise. In this case, the pressure of the distended blood-vessels on the biliary ducts may interfere with the outflow of the bile, and thus give rise to a slight icterus. Further, the intra-abdominal venous congestion leads to overfilling of the haemorrhoidal veins, and hence to bleeding piles.

When the congestion is long-lasting, various further morbid changes may arise, pulmonary hyperæmia may eventuate in bronchitis, hyperæmia of the cerebral meninges may cause very severe headache, there may be syncopal attacks, tinnitus aurium, choroidal congestion, impaired vision, etc.

Congestion of a more active nature arises from an increased and usually accelerated flow of blood through

the vessels of a part in which the resistance to the blood stream has been lowered proportionately to its propulsive force. In this way arises that characteristic symptom of the menopause known as ardor fugax—fugitive heat—one link in the long chain of vasomotor manifestations occurring at this period of life.

Fugitive heats are commonly most clearly marked in the face, head, and neck, in which region there suddenly occurs a reddening of the skin, with diffuse and increasing subjective sensation of heat. At the same time there is often a sense of tension, as if the part were about to burst. Actual slight swelling may be noticed, the eyes sparkle and are somewhat prominent, the head feels heavy, stupid, and dizzy. Sometimes these symptoms last for a considerable period; at other times they terminate speedily and suddenly with a local perspiration or with an attack of epistaxis. Not infrequently, after lasting a short time in one region, they pass away as rapidly as they came, but are immediately succeeded by a similar attack in some other part of the body, or by vasomotor phenomena of a slightly different kind. Thus, such a flushing and heat of the face may be replaced by a sudden sense of heat in the small of the back or in the sacral region, by pruritus of the extremities, by palpitation of the heart, or by an attack of pseud-angina.

A further consequence of active hyperæmia is the onset of those confused states, so common in the climacteric age, of mental and bodily disquiet, which find expression, now in states of excitement, and now in states of depression. So we often observe change of disposition, associated with incapacity for regular work, while sleep is restless, and much disturbed by dreams; and again states of dizziness, a sense of mental uneasiness and confusion, and even actual delirium.

In the skin, in addition to the fugitive heats, we often have a peculiar pricking, itching, or stabbing sensation, and various kinds of hyperæsthesia, frequently associated with disturbances of tactile sensation. We observe also muscular twitchings, and general weakness of the organs of locomotion.

In association with the passive and active hyperæmias of the menopause, we frequently see increase or some qualitative change in the various secretions. Above all, these changes affect the various secretions of the different reproductive organs, but we have also increased intestinal secretion, leading to diarrhœa, increased excretion of urinary deposits, and increased secretion by the skin. Symptoms which are common at the menarche, and frequently recur at the menopause, are: headache, migraine, a state of pseudo-narcotism, slight hysterical attacks, indications of moral insanity, lumbo-abdominal neuralgias, neuralgia of the breasts, leucorrhœa, and various skin eruptions.

According to Tilt, the changes occurring in the organism at the climacteric period may be summarized under the following heads:

1. Increased elimination of carbonic acid by the lungs.
2. Increased elimination of uric acid in the urine.
3. Increased perspiration.
4. Increased mucous flux.
5. Hæmorrhages from various organs.

As regards the first point, the extensive researches of Andral and Gavaret have shown that in the female sex the quantity of carbonic acid eliminated by the lungs diminishes when menstruation first appears at puberty, but increases again at the climacteric age, when menstruation ceases—whereas in the male a gradual diminution in the elimination of carbonic acid

begins already in the 36th year of life; in old age the quantity eliminated is greatly reduced in both sexes alike.

CHANGES IN THE FEMALE REPRODUCTIVE ORGANS AT THE MENOPAUSE

In considering the changes that take place in the female reproductive organs at this period of life, we must distinguish between the proper period of the *climacteric*, with its various manifestations antecedent to and associated with the irregularity and ultimate cessation of menstruation, from the condition of *old age* in which menstruation has actually and completely ceased, in which the menopause has been fully accomplished, and in which the changes of senescence have set in at once in the organs of the reproductive system and in the organism as a whole.

The most important and most significant changes of this sexual epoch are unquestionably the anatomical alterations in the ovaries. A good many years ago I undertook an investigation whose purpose was to follow the natural involution of the graafian follicles from the time of the climax on into old age, and for this purpose I examined a very large number of ovaries of women at ages varying from 42 to 75 years (*Archiv für Gynecologie*, Bd. XII., Heft 3).

Throughout these years a slow but continuously progressive atrophy proceeds in the ovaries; they become smaller and denser, diminishing especially in height and width; their surface becomes extremely uneven; and in extreme old age they wither away until no more is left in the region formerly occupied by the ovaries than a flattened fibro-vascular thickening. The histological characteristic of the changes in the ovary which proceed gradually from the commence-

ment of the menopause to extreme old age, may be summed up as consisting in a continual increase and new formation of the connective tissue stroma at the expense of the cellular layer, accompanied by retrogressive metamorphosis of the graafian follicles.

The connective tissue ground substances of the ovary increases from the periphery toward the centre, and progressively compresses the epithelial structures of the organ. In the outermost layer of the ovarian stroma, the so-called tunica albuginea, the strata of short, dense connective tissue fibres increase notably in number, so that whereas at first three layers at most could be distinguished, the tunic ultimately comes to consist of from six to eight layers; at the same time also the interior ovarian stroma becomes exceedingly dense, so that numerous well-defined interlacing bundles of fibres can be made out in its substance.

The first retrogressive metamorphosis which can be observed in the graafian follicles is fatty degeneration, the formation of granule spheres. Whilst the membrana propria (the theca folliculi) of the follicle remains quite unaltered, we observe in the membrana granulosa, in addition to the ovum, and the ordinary cells of this layer, spherical aggregates of fat droplets, the granule spheres, which continually increase in size, until ultimately of the cellular contents of the follicle nothing whatever remains, and it now appears full of granule spheres and fluid. The theca folliculi has now lost its spherical shape, and assumes an ovoid form.

In a later stage of the degeneration of the graafian follicle, it appears as a vesicular body with a relaxed wall, thrown into numerous folds, this folded wall being formed by the theca folliculi. The cavity of the follicle is reduced to a mere cleft filled with a transparent substance, and the space between this cleft and

the inner surface of the theca folliculi is occupied by round cells and a fibrous intercellular substance, and is traversed by a vascular network. This second stage of the retrogression of the follicle may therefore be designated the stage of vesicular degeneration.

In the last stage of this retrogressive metamorphosis, we find the follicle completely transformed to a fibrous mass. It appears as an elongated oval body, much lobulated, connected with the surrounding stroma by thick strands of fibres; a trace of the original cavity can still be distinguished in the form of a narrow cleft, without distinguishable contents. The tissue of this body consists of connective tissue fibres, with interspersed nuclei and nuclear fibres.

The three stages I have observed in the retrogression of the follicle, of which I have given a summary account above, may, I think, be explained in the following manner: When the woman's reproductive activity ceases, the graafian follicles become subject to a retrogressive metamorphosis, a fatty degeneration setting in in the cells of the membrana granulosa and in the ovum, until ultimately the whole of the granular epithelium has undergone atrophy. The follicle now undergoes a vesicular transformation with shrinkage of its cavity, and with the formation of a new tissue which appears to be young connective tissue. As time goes on, this new connective tissue is formed in increasing quantities, until finally the entire follicle is transformed into a firm fibrous mass.

Thus we are led to infer that the gradual but extensive thickening of the tunica albuginea (i.e., the outer, condensed layer of the ovarian stroma), which, as we have seen, always occurs at the climacteric period, offers a hindrance to the bursting of the follicles as they mature, and in this we find the explanation of

the irregularity of menstruation and of the various troubles which attend the performance of that function at the time of the menopause. It is reasonable to assume that the resistance of this thickened tunica albuginea is responsible for the fact that the interval between the bursting of the successive follicles is now greater than normal, as much as six or eight weeks—this retardation of menstruation being one of the commonest ways in which the onset of the menopause is first manifested. Another phenomenon connected with the onset of the menopause also finds a plausible explanation in the anatomical grounds just mentioned. As already pointed out, in parous women the menopause sets in later than in nulliparæ. At every pregnancy, the ovaries share in the more abundant nutrition of all the reproductive organs, due to the general dilatation of the intra-pelvic vessels which accompanies this process; hence the ovaries become larger, richer in lymph, and therefore softer, the cellular elements increase in size, and perhaps also in number, and it is readily conceivable that in such ovaries the cellular elements are able for a longer time to resist the induration and the new formation of connective tissue which occur at the climacteric.

The numerous nervous disturbances of the climacteric epoch would appear also to depend upon the hyperplasia of the ovarian stroma which we have observed to be the characteristic anatomical change in the ovaries at this period of life.

'Associated with the fibrous transformation of the graafian follicles there is, however, a failure of the so-called internal secretion of the ovaries, a matter to which much attention has recently been paid. Brown-Séquard has especially maintained that the ovaries secrete a substance which enters the blood, a substance

which, notwithstanding the fact that its presence cannot be proved either by chemical or any other means known to us, yet is of considerable importance for the maintenance of the equilibrium of mental and physical well-being. It is supposed that the various profound disturbances of the general system occurring at the menopause¹ are dependent upon the cessation of this internal secretion of the ovary—disturbances which rise to a maximum as the atrophy of the ovary proceeds, and which only gradually pass away after a considerable lapse of time.

After the menopause is completely over, in the ovaries, as in other parts of the female reproductive organs, the signs of senile degeneration make their appearance.

In old women, we find the ovaries either shrunken to the form of small fibrous cords, or else degenerated to form cysts of smaller or larger size, the stroma surrounding these cysts being extremely hard, dense, and tough.

Whereas at the commencement of the climacteric period the uterus commonly exhibits a slight increase in size, owing to the condition of passive hyperæmia already described, subsequently a gradual diminution in the size of the organ may be observed. This atrophy begins with the portio vaginalis and proceeds upward. Whilst the body still appears undiminished in size, the vaginal portion will be found already shorter, more slender, and more flaccid. Gradually, however, the entire organ is involved in the atrophic process. The uterus is then smaller than formerly, its walls are

¹ NOTE.—In Germany, the term *Ausfallserscheinungen* is used as a general name for the various disorders of the climacteric period. The word *Ausfall* means literally a *falling out*, or *shedding*, as of the hair. No precise English equivalent of the term is known to me, nor is one really needed, the phrase *disorders of the climacteric* being sufficiently distinctive.

—TRANSL.

thinner, its cavity reduced in size. Its vascularity and its sensibility are alike diminished. The external os is smaller, and the internal os is sometimes entirely obliterated. There is a tendency at the climacteric period for the tubulo-racemose glands of the cervical mucous membrane to undergo a cystic degeneration, and hence arise the cysts which are so commonly met with on the portio vaginalis of women at this time of life, cysts varying in size from that of a millet seed to that of a pea. In advanced life, the formation of such cysts may be regarded as normal, and sometimes in the form of grape-like clusters they almost completely occupy the lumen of the cervical canal.

Not infrequently these cysts lead to the formation of polypi, by enlarging until the mucous membrane projects so far that a stalk is formed.

Examining the bodies of 47 women who died at ages varying from 42 to 80 years, I found in 28 ovula Nabothi in the cervical mucous membrane, for the most part at the os uteri externum, but in some cases also extending up to the os internum, sometimes between the plicæ palmatae, sometimes isolated, sometimes grouped.

Sometimes in old women no trace of a vaginal portion remains, and the uterus is found to be transformed to a small, thin-walled, shrunken body, no more than one-fourth of its original size; in such cases the saying of Graaf appears to be justified, that after the menopause the uterus returns to the size it has in the young girl. In the majority of such cases, the cavity of the uterus is also contracted (concentric atrophy). It sometimes happens, however, that in old age the os externum and the os internum are the seat of atresia, whilst the intermediate portion of the cervical canal remains unaffected. In this way, especially when the

cervical canal and the cavity of the body of the uterus are distended with mucus or with fungous growths, is produced what is known as the *uterus bicameratus vetularum*.

In many cases, when the cervical canal has been obliterated, we find the uterine cavity distended with mucous secretion (excentric atrophy). The substance of the uterine wall is in old age commonly dense and tough, but occasionally, in extreme old age, less firm than formerly, withered and friable, and traversed by degenerated arteries, and in this state it is predisposed to haemorrhages (apoplexia uteri). Such intra-mural haemorrhages usually occur in the fundus; the friable uterine substance has then a blackish-red appearance, infarcted with extravasated blood; sometimes the uterine cavity is also filled with blood. In general, it may be said that when the menopause is completely over, when uterine activity has entirely ceased, the uterus returns to the state in which it was before the menarche—it is physiologically dead.

The tubes become flaccid, thinner, shorter, and are at times obliterated. In the mucous membrane of the tubes in old women we no longer find any trace of the glands described by Hennig; the epithelial cells have also lost their cilia.

During the climacteric period, the vagina is usually relaxed and roomy, the mucous membrane is smooth, injected and secretes freely; subsequently, in old age, it becomes firm, tough and dry.

Wendeler found that the initial change of the climacteric in the ovary is a chronic and progressive endarteritis obliterans; the result of this process is, in addition to the obliteration of the follicles, a continually increasing hyaline degeneration of the smallest arteries and the arterioles, especially along the line of

transition between the cortical and the medullary substance of the organ; this degeneration extends to the surrounding connective tissue, and thus leads to the formation of peculiar, vitreous, translucent foci of sclerotic connective tissue, containing few cells or none; these are the so-called *corpora fibrosa* or *corpora albicantia*. Only subsequently to the formation of these bodies does the characteristic wrinkling of the surface of the ovary occur, with general shrinkage of the organ, these changes being due to the contraction that sets in in the numerous scattered foci of connective tissue, which, as already mentioned, are situated in close proximity to the cortex.

The gradual atrophy of the uterus after the extinction of its sexual activity leads to a diminution in all the diameters of the organ, so that in old women it becomes flattened as in childhood, all its curves having disappeared; the muscular substance is replaced by connective tissue; and the portio vaginalis dwindle^s and even entirely disappears.

As regards the bacterial flora of the genital organs of elderly women, Menge and Koenig find that the vagina for the most part contains bacteria which do not thrive when cultivated aërobically on alkaline agar plates. In exceptional cases, however, such bacteria are found, and may even be sufficiently vigorous to produce pyogenic infection. According to Strogamoff, the vagina in all circumstances contains a great variety of micro-organisms—cocci, diplococci and rod-forms. Rod-forms are the prevailing types found in normal conditions in elderly women, but they are much smaller than in women who are still in the period of reproductive activity. Organisms liquefying gelatine were found in one instance only, a case of vaginal prolapse. In one-half of the cases examined,

there was no development of culture media inoculated from the cervix uteri, whether on agar or gelatine.

THE TIME OF THE MENOPAUSE

The age at which the menopause begins is one which varies owing to manifold conditions, congenital and acquired, owing to the local influences which have been brought to bear on the reproductive organs during the menacme, and to the general circumstances of life during this period. In Northern Europe it commonly begins some time between the ages of 40 and 50 years. According to the most trustworthy statistical data, the commonest age for the onset of the menopause is between the ages of 45 and 50 years. Next to these in frequency we find the menopause commencing between the ages of 40 and 45 years. If, however, the menopause does not begin during the fifth decennium, it is more apt to occur during the quinquennium after 50 than during the quinquennium preceding 40 years of age; that is to say, an abnormally late menopause is more often met with than an abnormally early menopause. In a very small proportion of women does the menopause begin either after the age of 55 or before the age of 35.

THE AGE AT WHICH THE MENOPAUSE OCCURS

My own observations show that the age at which the menopause begins is affected by the following circumstances:

1. The race (nationality) of the woman.
2. The age at which the menarche occurred.
3. The sexual activity of the woman during the period of the menacme, the number of her pregnancies, the exercise or neglect of the function of lactation.

4. The social circumstances of the woman's life.
5. General constitutional and pathological conditions.

1. Race

From the statistical data regarding the age at which the menopause occurs among the women of the various nations of Northern Europe, it appears that the latest average age for the cessation of menstruation is met with in Lapland, namely 49.4 years; next comes Norway, where the average age is 48.9; next Germany, where the average age is 47; next England, 46.1; next Russia, 44; and finally Austria, 42.2. In the four principal capital cities, the average age is: in London, 45.5; in Paris, 43.65; in Vienna, 43, and in Berlin, 47. Generally speaking, in southern countries the cessation of menstruation occurs at an earlier age than in northern countries, as the following comparison shows: Northern countries: England (Tilt), 48 to 50; France (Courty), 50; North Germany (Mayer), 50; Austria (Szukits), 42; southern countries: Persia (Chardin), 27; Java, 30; various Asiatic races, 30 to 40.

In the case of 500 women of various nationalities in whom I was able to ascertain by personal observation the age at which menstruation ceased, I found that the menopause occurred:

In the quinquennium.....	35 to 40 in 48 women
In the quinquennium.....	40 to 45 in 141 women
In the quinquennium.....	45 to 50 in 177 women
In the quinquennium.....	50 to 55 in 89 women

Thus we see that in about one-tenth of my cases, menstruation ceased between the ages of 35 and 40; in more than one-fourth, between the ages of 40 and

45; in more than one-third between the ages of 45 and 50; and in about one-sixth between the ages of 50 and 55. In 267, that is, in more than one-half of the 500, menstruation ceased between the ages of 42 and 51. In 28 women, menstruation ceased before the age of 35; and in 17, after the age of 55. In a very large majority of my 500 cases the women were of German or Austro-Hungarian nationality; next, in order of frequency, came Poles, Russians, women of various southern countries, Swedish women. In women of Sclavonic nationality, menstruation ceased remarkably late as compared with women of German nationality.

Brierre de Boismont, Tilt, Courty, and various other observers, have published statistical data regarding the age at which menstruation ceases in women of different nationalities. Krieger, compiling from several authors, statistics relating to 2,291 women (European) gives the following average results: menstruation ceased

Between the ages of 35 and 40 in.....	272 women	11.87 per cent.
Between the ages of 40 and 45 in.....	595 women	25.97 per cent.
Between the ages of 45 and 50 in.....	940 women	41.03 per cent.
Between the ages of 50 and 55 in.....	334 women	14.58 per cent.
Before 35 and after 55 in.....	150 women	6.54 per cent.

2291

99.99

2. *The Age at Which the Menarche Occurred*

Until recently, it was generally believed that the earlier the age at which menstruation first made its appearance, the earlier also would the menopause occur; and that, on the other hand, the later the age at which the flow began, the later also would it cease. Virey summarized this opinion in the saying: prius pubescentes prius senescunt. This view of the matter

is, however, true only in respect of the influence of climate upon sexual development. In a cold climate, a woman begins to menstruate late and ceases to menstruate late; in a hot climate the opposite conditions prevail. But if we make our comparison between women living in similar conditions as regards latitude and climate, we find that Virey's saying is far from accurately describing the facts.

In general, and climatic influences apart, it may be said that the earlier in any woman the age at which menstruation first occurs, the later will be the age at which menstruation ceases.

In order to ascertain the influence of the age at the menarche upon the disappearance of menstrual activity, I placed in comparison first the cases of 50 women in whom menstruation had first appeared between the ages of 12 and 16—i.e., cases of early menarche; and secondly, the cases of 50 women in whom menstruation had begun between the ages of 16 and 20—i.e., cases of late menarche. The result was the following:

In the 50 women in whom the menarche had been early, the menopause occurred

- At ages 35 to 40 in 5 instances.
- At ages 40 to 45 in 12 instances.
- At ages 45 to 50 in 25 instances.
- At ages 50 to 55 in 8 instances.

On the other hand, in the 50 women in whom the menarche had been late, the menopause occurred

- At ages 35 to 40 in 9 instances.
- At ages 40 to 45 in 28 instances.
- At ages 45 to 50 in 10 instances.
- At ages 50 to 55 in 3 instances.

Thus whilst among the women in whom the menarche had been late, there were thirteen only who continued to menstruate until they were at least 45

years of age, among those in whom the menarche had been early, the number in whom menstruation thus continued up to the age of 45 or beyond was 33, nearly three times as great.

On the other hand, in those cases in which the menarche occurred at an *abnormally* early age, i.e., before the age of 12 years, the menopause was also a remarkably early one. The menopause also came on very early in women in whom the menarche had been extremely retarded, until the age of 20 and upward. An extremely early and an extremely late menarche alike tend to be followed by a premature menopause.

To this rule there are, however, exceptions, and we occasionally meet with women whose reproductive energies are so powerful that the menarche occurs at an unusually early age, and the menopause is postponed to an age considerably beyond the average. Thus, among 100 women in the Salpêtrière, Raciborski observed 29 in whom menstruation had begun at the exceptionally early age of 12 years, and who, notwithstanding this, all experienced a very late menopause. Three of them were still menstruating at the age of 57, 1 at 56, 2 at 52, 2 at 50, 3 at 48, 3 at 45, and 13 at an age less than 45.

Briere de Boismont reports the case of a woman who began to menstruate in her 12th year; she married, had several children, and continued to menstruate regularly until she was 60 years of age.

The results obtained by W. Guy, who examined a series of 250 cases, confirm the proposition stated above, that the earlier menstruation begins (the extremely early cases being excluded), the later it ceases.

According to Cohnstein, who bases his conclusions upon the observation of 400 cases, in women who begin to menstruate early, the menopause occurs on an

average three years later than in women who begin to menstruate late. Puech also states that menstruation lasts longer in women who begin to menstruate early than in those who begin to menstruate late. According to Scanzoni, in women who begin to menstruate in *very* early youth, the climacteric age is commonly reached earlier than in those in whom puberty occurs at the normal age—commonly between the ages of 40 and 42 years.

The homology between the pathological states which, in any particular individual, occur at the respective periods of the menarche and the menopause, is sometimes extremely remarkable; the very same symptoms by which the first appearance of menstruation was preceded, recur as antecedents of the menopause. This is seen in the case of certain eczematous conditions of the skin, of dyspeptic manifestations, epistaxis, nervous disturbances, hysterical and epileptic seizures, vaso-motor symptoms, congestions, cardiac troubles, albuminuria, etc. Alibert pointed out that certain skin diseases may appear twice only during life, once shortly before the commencement of menstruation, and the second time shortly before the cessation of menstrual activity. Brierre de Boismont alludes to the occurrence of hysteria and epilepsy before both these important epochs in a woman's life, whilst in the intervening period the patient had remained entirely free from such troubles. H. Marsh records the observation that women who just before puberty have suffered from repeated attacks of epistaxis, have suffered from the same trouble as a predominant symptom of the climacteric period. Tilt has seen in several cases the outbreak of numerous furuncles with subsequent diarrhoea, and still more frequently peculiar attacks of severe vertigo, occurring in women just before the two

critical epochs in her life, whilst in the intervening period there has been no trace of such troubles, either in connection with menstruation, with the puerperium, or with lactation.

3. *The Woman's Sexual Activity*

An important influence upon the early or late onset of the menopause is exerted by the degree to which a woman's reproductive functions have been exercised during the menarche. My personal observations have shown me that in women who are in good health and of a powerful build, whose menstrual flow has always been regular and sufficient in quantity, whose reproductive organs have been adequately and properly exercised, who have had a physiological amount of sexual intercourse, have given birth to several children, and have suckled these children, the cessation of the menstrual flow generally occurs much later than in women in whom the conditions of the sexual life have been the opposite of those just mentioned. The more regular menstruation has been, and the more normal the deliveries, the later does the menopause ensue.

Especially striking is the influence of the number of deliveries upon the time of occurrence of the menopause. In women who have given birth to a number of children, menstruation, as a rule, continues for several years later than in sterile women, or in those who have had one or two children only. If a woman suckles her children, the date of the menopause appears also to be postponed. Deliveries late in life seem likewise to delay the onset of the menopause, whereas abortions accelerate its occurrence. If, however, pregnancy succeeds pregnancy at extremely short intervals, the menopause is likely to occur early; the same result is brought about by sexual intercourse at too early an

age. The menopause occurs latest in women who have begun to menstruate early, who have married, have given birth to more than three children, and have been delivered of their last child at full term when 38 to 42 years of age.

As regards the 500 women previously mentioned, in whom I made personal observation as to the age at which the menopause occurred and the circumstances by which its onset was influenced, the effect of marriage and the number of children born is shown by the following details:

Of the 48 women in whom the menopause occurred between the ages of 35 and 40, 16 were unmarried, 6 married and childless, 18 married with one or two children, 8 married with more than two children.

Of the 141 women in whom the menopause occurred between the ages of 40 and 45, 3 were unmarried, 4 married and childless, 46 married with one or two children, 88 married with more than two children.

Of the 177 women in whom the menopause occurred between the ages of 45 and 50, 1 was unmarried, 2 were married and childless, 32 married with one or two children, 142 married with more than two children.

Of the 89 in whom the menopause occurred between the ages of 50 and 55, none were unmarried, none were childless, 19 were married with one or two children, 70 were married with more than two children.

Of the 17 women in whom the menopause occurred at an age above 55 years, there were two only who had not had more than two children, whilst there were 10 who had had six to eight children.

The influence of lactation is shown by the fact that in the case of 40 women who had not suckled their children, the mean duration of menstrual activity was

four years less than the established mean duration of 27 years.

4. The Social Circumstances of the Woman's Life

The conditions in which a woman passes her life are not without influence upon the time of onset of the menopause. In general it may be said that among the women of the laboring classes, whose livelihood is so often precarious, and who are apt to suffer from habitual physical overwork, menstruation ceases at an earlier age than among the women of the well-to-do classes and those who lead an easier life. But though the climacteric thus occurs earlier among the lower than among the upper classes, the difference is not a considerable one.

According to Mayer's calculation, the mean age at which menstruation ceases is, in upper class women, 47.13 years, in lower class women, 46.97 years. Small as this difference appears, amounting on the average to no more than two months, it must not be forgotten that among the upper classes menstruation begins earlier than among the lower classes, by an amount which averages 1.31 years. Thus the total duration of sexual activity is almost one and a half years longer in the upper than in the lower classes.

5. General Constitutional and Pathological Conditions

An important influence upon the time of occurrence of the menopause is exerted by the individual and hereditary predisposition of the woman, by her constitutional state, and by certain illnesses from which she has suffered. Women who by inheritance are constitutionally weakly and delicate, in whom the menstrual flow has always been pale and scanty, in whom the intermenstrual intervals have been excessive, and who have

a slender habit of body, attain the climacteric age earlier than women with vigorous bodily development and powerful muscles, with large breasts, and in whom menstruation has always been regular and abundant. Women with a great tendency to obesity cease to menstruate earlier than women of more normal proportions; blondes earlier than brunettes; women of phlegmatic temperament earlier than women of a sanguine and ardent temperament.

In general it may be said, that all influences which have a weakening effect upon the feminine organism, tend also to accelerate the onset of the menopause: such are, severe labor, great sorrow, wearisome occupations, severe menstrual losses, rapidly succeeding pregnancies, and abortions; also a number of pathological general states shortly to be discussed, as well as local diseases of the reproductive organs.

Fritsch points out that menstruation continues to a later age in proportion as the woman's state of general nutrition is a good one. He also asserts that women with a very large uterus, who have always had an abundant menstrual flow, those with retroflexion, with hypertrophy of the portio vaginalis, or chronic endocervicitis and endometritis, and those with small myomata which have given rise to no marked symptoms, often continue to menstruate far beyond the usual age.

The mean duration of the climacteric phenomena, from the commencement of these until the final cessation of menstruation, is about two years. This mean is made up of extremely wide individual variations; in a small proportion of the cases the climacteric manifestations may last no more than a month or two, whilst at the other end of the scale we meet with cases in which the duration extends to 4, 6, 8, and even 18 years.

In considerably more than half of all the cases, how-

ever, the duration of the climacteric manifestations varies between six months and three years. Thus, in Tilt's series of cases, the duration of the "change of life" was

6 months in.....	12.07 of all cases
1 year in.....	22.64 of all cases
2 years in.....	18.62 of all cases
3 years in.....	9.43 of all cases

6. Premature, Delayed and Sudden Onset of the Menopause

In exceptional cases, the menopause, instead of taking place between the fortieth and the fiftieth year of life, occurs at an abnormally early or an abnormally late age.

Premature cessation of menstrual activity, in the third or the fourth decennium of life—very rarely indeed before the third decade—depends in part upon disturbances of metabolism and of haemopoiesis, and in part upon diseases of the female reproductive organs; in some cases, however, it may be due to some hereditary constitutional peculiarity; or it may occur suddenly, in consequence of some violent shock to the nervous system.

Among the disorders of metabolism which may lead to a premature menopause, excessive adiposity, lipomatosis universalis, occupies the first place. Next in order of importance come a chloro-anæmic condition of the blood, pernicious anæmia, splenic leukæmia, certain of the acute infectious disorders—typhoid, cholera, scarlatina, acute articular rheumatism—further pulmonary tuberculosis, diabetes mellitus, Graves' disease, Addison's disease, and myxœdema. These various conditions may give rise, in part by infective processes, and in part in consequence of the general cachectic condition, to atrophy of the ovaries with destruction of the

graafian follicles, and to adipose processes in the uterus, and these changes lead to the premature cessation of menstrual activity.

Excessive obesity has a restrictive influence upon ovarian activity, manifested in part, as already mentioned, by the occurrence of sterility, but in part also, in very obese women, by the onset of a premature menopause. Among 215 cases of extreme obesity in women, I found 49 in which the menopause occurred at a remarkably early age. In these cases the menopause occurred at the following age:

In 1 woman at the age of.....	17 years
In 14 women at the age of.....	20 to 25 years
In 11 women at the age of.....	25 to 30 years
In 9 women at the age of.....	30 to 35 years
In 14 women at the age of.....	35 to 40 years

In none of these cases did the local examination of the reproductive organs disclose the existence of any noteworthy disease.

Of the diseases of the genital organs which are competent to give rise to a premature cessation of menstrual activity, the most important are the puerperal infective processes and other inflammatory states of the reproductive organs, with their results—chronic metritis, perimetritic and parametritic exudations, chronic oöphoritis, atrophy of the uterus and the ovaries.

After infective puerperal processes, it sometimes happens that there is far-reaching destruction of the uterine musculature, degeneration of the uterine mucosa, permanent and irreparable atrophy of the uterus, and suppuration and atrophy of the ovaries—conditions which result in an extinction of menstrual activity. A similar result may ensue upon the persistent and long-continued pressure upon the uterus and the ovaries of a large intra-pelvic exudation; such exuda-

tion being commonly post-puerperal, but occasionally arising in the absence of pregnancy. Further, according to Freund, chronic atrophic parametritis may give rise to an incurable atrophy of the uterus, by interference with the circulation of the blood through the broad ligaments, and consequent impairment of the nutrition of the uterus. Gonorrhœal inflammation may also lead to the termination of menstrual activity, when it gives rise to intramural inflammatory deposits in the uterus, and to chronic inflammatory processes in the ovaries. Tumors of the uterus and the uterine annexa may likewise induce a premature menopause.

We also meet with cases in which after a pregnancy, to all appearance normal in its course and termination, a premature menopause results. To this category belong the cases, according to Kleinwächter of no extreme rarity, in which perfectly healthy women are attacked by profuse uterine haemorrhage during the course of a normal, full-term labor, or during miscarriage; subsequently, though the lying-in period is passed without further misadventure or abnormality, and in the absence of lactation, the patient becomes permanently amenorrhœic. The normal involution of the uterus passes on into hyperinvolution, and ultimately complete atrophy of uterus and ovaries results. In some cases, moreover, such hyperinvolution with consecutive atrophy follows normal labor or abortion without the occurrence of any excessive haemorrhage.

Much more frequently do we find that rapidly successive pregnancies, with long-continued exercise of the lacteal function, in badly nourished, anaemic women, give rise to a premature menopause, due to permanent atrophy of the uterus and ovaries, which are in such cases so poorly supplied with blood. This "lactation-atrophy" is described by Frommel and Thorn as a

concentric atrophy first of all affecting the corpus uteri, and to this, if the disease advances, there succeeds a general atrophy of the muscular, connective, and fatty tissues of the parametrium, the vagina, the pelvic floor, and ultimately of the ovaries, leading, when permanent, to a premature menopause.

Trauma of the genital organs may also lead to uterine atrophy and to premature menopause.

By many authors it is believed that too-early marriage, sexual excesses, and prostitution, may be the cause of *cessatio præcox*. In some cases, there is unquestionably a hereditary predisposition to a premature climacteric, since the mothers of the women in whom it occurs have themselves been similarly affected. In a remarkable case which came under my own observation, of a woman from Smyrna, there was hereditary predisposition. This woman began to menstruate when 12 years of age; menstruation was always scanty; she married when 15 years of age; and she ceased to menstruate forever at the age of 19. In other cases we find there is a family tendency for menstruation to be delayed in its first appearance to a comparatively advanced age, and to cease at the usual time.

In cases of *cessatio mensium præcox* (unless the failure of menstruation has been quite a sudden one), and after the premature menopause is fully established, we find in the uterus and the ovaries anatomical changes similar to those met with after the natural climacteric—diminution in the size of the uterus with thinning of its walls, density and firmness of the tissues of the organ, smallness and a soft consistency of the ovaries; sometimes, also, the mammae are atrophic.

In cases of premature menopause, the troubles attending the change are commonly more severe and more enduring than those that occur at the natural

menopause. Especially is this the case when the premature menopause is quite a sudden occurrence, but this phenomenon is rare. Most commonly the premature menopause is gradual in onset; the flow becomes more scanty month by month, until at last it fails altogether to appear. Irregularity in the menstrual rhythm is not often seen in such cases. Early senescence is exceptional in these women in whom a premature menopause occurs. Emaciation, grayness of the hair, wrinkling of the skin, the growth of hairs on the face, etc., are not usually associated with the atrophy of the reproductive organs; the physiognomy and figure of women with *cessatio præcox* being usually similar to those seen in women of corresponding age in whom menstruation still continues.

Tilt inquired regarding the cause of *cessatio præcox* in 27 instances, with the following results:

In 3 instances, parturition and lactation.

In 1 instance, abortion.

In 2 instances, a fall on the sacrum during menstruation.

In 2 instances, suppression of menstruation from chill.

In 1 instance, hæmorrhage from the arm during menstruation.

In 1 instance, celebration of nuptials during menstruation.

In 2 instances, severe medicinal purgation.

In 2 instances, cholera.

In 2 instances, rheumatic fever.

In 2 instances, febrile bronchitis.

In 9 instances, intermittent fever.

In 1 case Tilt saw cessation of menstruation occur at the age of 29, in consequence of metritis. Atlee, in 15 cases of ovarian tumor, saw the menopause occur at

the ages of 30, 39, 40 and 42. Puech saw a premature menopause at the age of 30 in 3 cases, in each a sequel of cholera. Blondel reports a case of *cessatio præcox* after prolonged galactorrhœa, although the woman had not suckled her infant; Gottschalk and Rokitansky, cases following injury to the cervix uteri; Kiwisch, Simpson and Kleinwächter, cases following full-time, normal deliveries, in which, however, severe losses of blood had taken place.

Courty and Brierre de Boismont report cases in which the menopause occurred as early as the age of 21; Mayer, 2 cases at the age of 22; Krieger, 1 case at 23; Brierre de Boismont, 1 case at 24; Mayer, 2 cases at 25; Brierre de Boismont, 1 case at 26, and 1 case at 27; Guy and Tilt, each 1 case at the age of 27; Brierre de Boismont, Courty, and Guy, each 1 case at the age of 28; Brierre de Boismont, Courty, and Mayer, each 1 case at the age of 29; Guy and Tilt, each 1 case at the age of 30; and Mayer, 5 cases at the age of 30.

An unusually late climacteric, the continuance of menstruation beyond the age of 50 years, is not an extremely rare occurrence, but is less often seen than *cessatio præcox*. There is, however, in these cases a difficulty which must not be underestimated, namely, to distinguish between a genuine menstrual bleeding and the other uterine hæmorrhages which are common precisely at this age of life, due either to textural changes in the uterus, or to neoplasma—more especially because in these non-menstrual hæmorrhages also a certain periodicity may often be detected. When on careful examination no abnormality can be discovered in the reproductive organs, when the bleeding in question recurs at the intervals and in association with the general symptoms to which the woman thus affected has been accustomed during her previous menstrua-

tions, and when the amount of blood discharged is not abnormal, it is permissible to conclude that we have to do with a persistence of true menstruation, even though the woman has some time since completed the fifth decennium of her life. In some women, in fact, the reproductive system is so energetic, that ovulation continues to an age far beyond the average, and such women are to be regarded as sexually long-lived.

Although the instances of protracted menstruation contained in the older literature of the subject are open to suspicion, owing to the fact that at that time it was not possible to distinguish with certainty between menstrual and pathological uterine haemorrhage, quite recently numerous incontestable cases of enduring sexual vitality have been put on record.

I have myself seen no less than 106 cases in which the menopause did not occur until after the age of 50 years; among these there were 4 in which the age at the menopause was 56; 5 in which it was 57; 2 in which it was 58; 1 in which it was 59; and 1 in which it was 60. Tilt records 128 cases of menopause occurring after 50; among these there were 4 in which the woman was 56 when menstruation ceased; 2 who were 57; 4 who were 58; 1 who was 59; 1 who was 60; and 2 who were 61. Courty reports a case in which menstruation persisted after the age of 65; Mayer, 3 cases of menopause at 64; Beigel, 2 cases, 1 in which menstruation continued to the age of 65, the other to the age of 72. Kleinwächter observed 33 cases in which menstruation continued to an age varying from 50 to 57 years. Emmet, in the year 1886, published the case of a woman who was then 70 years old, and who at this advanced age continued to menstruate regularly.

That not every case in which after the age of 50 years there is recurrent, more or less periodic, haemor-

rhage from the genital organs, is to be regarded as an instance of delayed menopause, we are taught by the records of post-mortem examination in several cases of the kind. Scanzoni reports the case of a woman who at the age of 60 was affected with a fairly regular periodic discharge of blood from the vagina. During one of these haemorrhages, she died of pneumonia, and the autopsy showed that the ovaries were completely atrophied and transformed into dense scar tissue, and contained no trace of corpus luteum or of fresh extravasation of blood, whilst in the upper part of the cervical canal there were two mucous polypi each of about the size of a bean. In another case, that of a woman 64 years of age, periodic losses of blood, at intervals of from three to four weeks, continued to the time of her death. This woman suffered from mitral valvular insufficiency, and it was clear that the haemorrhages had been due to the venous engorgement consequent upon imperfect compensation. The ovaries were completely atrophied, and showed no trace of any recent maturation of ova; the uterus was enlarged, the mucous membrane hyperæmic, and the cavity contained a recent clot.

Not infrequently, the haemorrhages attributed to the persistence of menstruation are really due to senile arteriosclerosis—to rigidity and brittleness of the uterine arteries; in other cases they arise from varicosity of the veins of the cervical canal. A common cause of such bleedings from the genital passage in comparatively advanced life, is to be found in the growth of uterine myomata.

To myoma uteri we must attribute a part, though by no means all, of the cases in which menstruation seems to recur some years after the menopause has, to all appearance, been fully established. In most of these

cases, indeed, we have to do with pathological hæmorrhages, the cause of which is, however, but too often obscure. Still, cases certainly occur in which, two or three years or even longer after the menopause, some unknown stimulus leads to the regular recurrence of menstruation. The possibility of such an occurrence is, in my opinion, fully proved by post-mortem examinations of the bodies of elderly women in whom the menopause has been fully established and yet the ovaries are found to contain follicles of various degrees of ripeness, and also fresh corpora lutea—signs that ovulation may persist for a considerable time after the complete cessation of menstruation. Another proof of the last fact is the well known experience that women who have some time ago ceased to menstruate, may nevertheless become pregnant. Waldeyer, indeed, asserts that when four years have elapsed since the menopause, follicles are never to be found in the ovaries, but this negative experience is not decisive, especially as regards the cases in which regular menstruation is resumed some time after the occurrence of a premature menopause.

I have myself seen several cases in which the menopause occurred at 35, 38, 39, and 42 years, respectively; 3, 4, or 5 years later, as a result of hydropathic treatment, regular menstruation recurred. In one case, a woman who had ceased to menstruate ten years before, gave birth to a child at the age of 45.

Numerous indisputable cases of this kind are reported in the recent literature of the subject. Krieger had under his personal observation a woman of a robust habit of body, in whom menstruation ceased at the age of 48 years, her eighth child having been born fifteen years before. Two years later irregular menstruation recurred, and on the cessation of these hæmorrhages,

it appeared that the woman was once more gravid; she was delivered at full term of a girl. Mayer observed the following case: A strong working-class woman, 33 years of age, had begun to menstruate regularly when 13 years old; between the ages of 17 and 28 she gave birth to five children, and in addition had one miscarriage when 19 years old. Widowed at the age of 29, she fell ill, and on examination the uterus was found to be small and relaxed, whilst the vaginal portion of the cervix was reduced to a mere rudiment. Since she had been 22 years of age she had had persistent leucorrhœa, but no trace of menstrual hæmorrhage; yet since that age she had had three children. Renaudin delivered a woman 61 years of age, who had ceased to menstruate 12 years earlier. Meissner reports a case in which a woman first began to menstruate at the age of 20, had her first child when 47 years old, and gave birth to the last of her eight children when 60 years of age.

The sudden and permanent cessation of menstruation, whether at the normal climacteric age, or earlier in life, is always a pathological occurrence. As compared with the normal, gradual disappearance of menstruation, associated with the usual climacteric symptoms, such a sudden extinction of menstrual activity is, moreover, quite rare. When it does occur, the cause is to be found in one of various pathological general states, such as one of the acute infectious disorders, or some other exhausting disease, or sometimes in some local disease of the reproductive organs; occasionally, however, it may occur in perfect health in consequence of some powerful physical or mental stimulus, such as a severe blow or intense fright.

This sudden menopause has been observed after severe labor or abortion with profuse hæmorrhage,

or after cholera or typhoid; we must assume that in such cases the anaemia of the genital organs has disturbed the function of ovulation; whilst in cases due to mental shock, the interference with ovulation must be through the intermediation of the nervous system. Frequently, of course, in these cases, the sudden menopause is also a premature one.

Tilt reports a case in which a sudden menopause ensued upon phlebotomy during menstruation; several cases also in which women at ages varying from 30 to 34, or 39 years, ceased to menstruate suddenly and permanently in consequence of grief at the unexpected death of the husband; and another case of sudden menopause due to a fall down-stairs. Courty reports three cases of sudden menopause at the age of 30, consequent upon an attack of cholera. Dusourd has seen three cases in which, in women aged 40 to 43 years, severe haemorrhoidal bleeding was followed by sudden and permanent cessation of menstruation. Mayer reports the case of a delicate middle-class woman 34 years of age, who had begun to menstruate at the age of 14, had married at the age of 20, and at the age of 21 after a normal delivery, ceased forever to menstruate; and another case of a working-class woman 34 years of age who first menstruated at the age of 13 years, married at the age of 20, had two children in rapid succession, and finally ceased to menstruate, in consequence of a fright, at the age of 30 years. Krieger reports the case of a very nervous woman who first menstruated at the age of 13, and in whom at the age of 23 a sudden menopause ensued upon a nervous attack; in another case reported by the same observer, a sudden menopause occurred in a delicate woman 41 years of age owing to her husband's death—this woman had previously experienced six months' amenorrhœa.

in consequence of sorrow at the death of one of her children. The following remarkable case is reported by Brierre de Boismont: A seamstress began to menstruate at the age of 13 years; she married very soon after this, and gave birth to four children, the last when 21 years of age. In the course of the following year there was a fire in the house, and owing to this fright a sudden menopause occurred. Similar cases have been reported quite recently by Bossi and Walter.

The harmful influence which the occurrence of a sudden menopause exercises upon the general condition of the woman who experiences it, is manifested chiefly by violent circulatory disturbances, hyperæmia and congestion of the brain, lungs, and abdominal organs, and by states of excitement and depression of the nervous system. Of the vicarious haemorrhages which are apt to ensue upon such a sudden menopause, we have already spoken.

Generally speaking, women in middle life, in whom the whole organism is accustomed to the onset and decline of the menstrual hyperæmia, endure the functional disturbances induced by a sudden and complete cessation of menstruation much more easily than women who have already entered upon the climacteric age, or have nearly attained that age. The climacteric age is one in which women are already predisposed to circulatory disturbances in the pelvic organs, and it will readily be understood that in them the sudden interruption of the menstrual haemorrhages will have more serious consequences than in women in the prime of their sexual life, and therefore endowed with a greater power of resisting disturbances of the normal functions.

Diseases of the Organs of Circulation

Among the cardiac disorders of the menopause, the earliest and the commonest is, in my own experience, the following: At the time of the menopause, exceptionally not till after the complete cessation of menstruation, but usually at the commencement of this period of life, some time, that is to say, between the age of 40 and 50, either when menstruation has become irregular, the intermenstrual interval having become longer or shorter than has hitherto been the case, or when the discharge has become abnormal in character, a woman who has not before suffered from any kind of cardiac disorder, will begin to complain of paroxysms of palpitation.

In some cases the attacks of palpitation occur in the absence of any discoverable exciting cause; in others, some trifling stimulus gives rise to them. They may arise when the patient is in any position, walking, standing, sitting, or recumbent; sometimes even during sleep. The subjective sensation aroused by the increased force and frequency of the cardiac action is described as extremely distressing; it is associated with a feeling of anxiety (*Angst*), with a sense of pressure in the chest, with forcible pulsation of the carotids and of the abdominal aorta; frequently also with a feeling of a rush of blood to the head, with fugitive heats, and severe headache; sometimes toward the end of the attack there is a sense of flickering before the eyes (as of *muscae volitantes*), tinnitus aurium, dizziness, and in rare cases actual syncope.

Objectively, during the paroxysm, a notable increase in the frequency of the heart's action can be detected, the pulse-rate rising to 120 or even 150 per minute. In most of my cases, the pulse throughout the attack

remained strong, well-filled, and regular. Sphygmographic tracings taken during the seizures showed a remarkably high pulse-wave, the ascending limb of the curve rose rapidly and suddenly, the descending limb fell with corresponding steepness and rapidity, and it reached an unusually low level before the commencement of the dicrotic elevation, which latter was exceptionally large; the predicrotic elevations, on the other hand, were but slightly developed. On auscultation, the tones of the heart were pure but were louder than normal.

Sometimes during a paroxysm a sudden reddening of the face was noticeable, extending often to the neck and the thorax. In the areas mentioned, vivid red patches would suddenly make their appearance, disappearing more gradually after lasting a few minutes —this appearance was associated with a burning sensation of the affected areas. In some cases during the paroxysm there was an outbreak of perspiration on the head and the back.

Associated with these cardiac troubles of women at the climacteric we usually find a state of physical and mental disquiet; less common associations are, an incapacity for regular work, sleep uneasy and much disturbed by dreams, great general nervous irritability, or signs of passive congestion in various organs; occasionally there is œdema of the lower extremities; the urine remains free from albumin.

In most of the cases of this nature which came under my own observation, a certain plethora was noticeable; among women at the menopause, it was especially the well-nourished, powerful, sanguine individuals, that were liable to palpitation of the heart. Direct examination of the blood sometimes showed a very high hæmoglobin richness—110, 115, or even 120, as

compared with a haemoglobin richness of 93 in normal woman. Several of my patients presented the clinical picture of the plethoric form of lipomatosis universalis.

In all, during ten years, I observed 67 cases of paroxysmal tachycardia in climacteric women. The age distribution was the following:

36 years of age.....	1 woman
38 years of age.....	1 woman
39 years of age.....	2 women
40 to 45 years of age.....	37 women
45 to 50 years of age.....	28 women
Over 50 years of age.....	8 women

Five of the patients were unmarried, three were married but childless, the remaining 59 were parous women.

As a general rule, women live in great dread of all manifestations of bodily disorder during the menopause; those who become affected with paroxysmal tachycardia are exceptionally anxious, and regard themselves as threatened by a "stroke." This pessimistic view is, however, by no means justified. These cardiac disorders may make their appearance some time before the menopause, they may persist throughout the period during which menstruation is irregular, they may even endure for some time after the total cessation of the flow—but serious consequences of this climacteric tachycardia have never come under my observation. As regards treatment of the disorder, I have seen very favorable results from the following measures: The systematic employment of mild purgatives, combined with suitable dietetic and hygienic regulations (bland diet, regular and strenuous exercise, cold ablutions, and wet compresses surrounding the abdomen).

When we inquire regarding the cause of the tachycardiac paroxysms occurring at the menopause, we must first of all bear in mind that in the cases which have come under my own observation, the cardiac impulse was powerful, the pulse strong and well-filled, that signs of general vasomotor disturbance (*ardor fugax*, etc.) accompanied the tachycardiac seizures,—hence we are led to infer that we have to do with a stimulation of the excito-motor nerve fibres, which would appear to be due to the climacteric changes previously described as occurring in the female reproductive organs. This view receives support from the fact that after oophorectomy, when, as in the normal climacteric, atrophic processes occur in the internal reproductive organs, paroxysms of nervous palpitation are frequently observed. The same explanation applies to the fact that in women at the climacteric affected with these tachycardiac troubles, we frequently see in association therewith the symptoms of uterine dyspepsia.

But in addition to these local anatomical changes in the reproductive organs, to which an etiological rôle must be assigned in the production of climacteric tachycardia, the irritable state of the accelerator nerves must also depend in part upon that general nervous hyperexcitability which is so often a characteristic feature of the climacteric period in women, manifesting itself in manifold hyperæsthesias, hyperkinesias, neuralgias, and, in extreme cases, mental aberration. The sensory nerves are more irritable than in their normal state, so that every stimulus acting upon them evokes a greater central effect than heretofore, and upon this ensues an exaggeration of various reflex manifestations, which appear altogether disproportionate to the strength of the exciting cause; among these disproportionate reflex

effects, is to be numbered the tachycardia just described.

But in addition to the causes of climacteric tachycardia already enumerated, we have to take into consideration the results of recent investigations concerning the organo-therapeutic employment of the chemical constituents of the ovarian tissue; it would seem that when at the menopause the ovaries undergo atrophy, so that their internal secretion is no longer poured into the blood, the resulting alteration in the chemical constitution of that fluid gives rise to a disturbance of the vasomotor centre in the medulla oblongata.

In some cases, the tachycardiac paroxysms appear to be connected with the erotic excitement to which women are sometimes subject at the climacteric, voluptuous crises and ejaculation occurring; it is possible that in some of these cases masturbation plays a part.

A second group of cardiac troubles occurring in climacteric women consists of cases which are very common, but not often very severe. The cases in question depend upon the liability to an increased deposit of adipose tissue in the body at the time of the menopause, and in this connection the plethoric form of lipomatosis universalis almost invariably predominates. It is a well-known fact that between the ages of 40 and 50 years women have an excessive tendency to obesity, and that even those women who have hitherto been extremely lean are apt to become quite plump at the climacteric period. Chiefly in consequence of this increasing obesity, there occurs in climacteric women a series of cardiac troubles of very variable intensity. If the deposit of fat is effected very gradually, and if the obesity does not become extreme, it is only after vigorous bodily exercise, such as fast walking or going

upstairs; and after meals, that the patient is troubled with a little shortness of breath and moderate palpitation; appetite, digestion, and sleep remain usually unaffected in cases of this degree of severity. Definite attacks of cardiac asthma, and well-marked signs of cardiac insufficiency affecting the entire circulatory system, will very rarely occur in such persons.

It is an interesting fact, that the troubles which arise from fatty deposits around the heart are in general far less severe in climacteric women than they are in obese men of corresponding age. This may be due to the circumstance discovered by W. Müller, in the course of his investigations on the proportions of the human heart, that in the development of general obesity, the pericardial fat increases proportionately to a greater extent in the male than in the female. But in my opinion the true explanation is to be found in the fact that variations in the amount of fat in the body are normally far more extensive in women than in men; at puberty, during pregnancy, and during lactation, extensive though gradually effected changes in the amount of adipose tissue in various parts of the body occur, so that experience has rendered the organism ready to adapt itself to the further changes that take place at the climacteric—above all, the heart has become competent to meet very various demands upon its powers.

Only in women who from youth onward have exhibited a marked tendency to obesity, and in whom at the climacteric age such obesity has become extreme, do the cardiac troubles attendant on the menopause become very severe. In such persons, palpitation and shortness of breath occur on slight exertion, and attacks of cardiac asthma are frequent. In consequence of the diminished propulsive power of the heart, cir-

culatory difficulties make their appearance in the most widely divergent venous areas; the forms most commonly met with are, varices in the veins of the lower extremities, permanent dilatation of certain of the small superficial veins of the skin, phlebectases of the rectal veins (i.e., "piles"), and ultimately we see the well-known series of symptoms of venous engorgement—œdema of the feet, passive congestion of the lungs, albumin in the urine, etc.

When such cardiac troubles are present, the objective examination of the heart shows in the early stage no gross abnormality; at most the heart-tones seem somewhat weakened, with a moderate enlargement of the area of percussion-dulness, whilst the impulse is displaced a little outward, and is weaker than normal. In some cases, however, a marked dulness on percussion over the sternum indicates an extensive deposit of fat in the mediastinal tissues. In the second stage of the fatty heart, when the symptoms have become more severe, we find a considerable enlargement of the area of cardiac dulness both in the vertical and the horizontal extent; the cardiac impulse is diffused as well as feeble. The sounds of the heart are usually pure but faint—in some cases they remain loud and clear. Exceptionally, a short blowing murmur is heard with the first sound; and sometimes this sound is reduplicated.

Whilst in the first stage the pulse is hardly abnormal, in the second stage, very various changes occur; often it is subdicrotic or dicrotic in character.

In the great majority of instances, in these cases of cardiac disorder at the menopause, provided a suitable dietetic regimen is early adopted and perseveringly carried out, we may give a hopeful prognosis.

A third, less common but far more serious form of cardiac disorder occurring at the menopause, displays the well-known symptoms of cardiac failure. Those thus affected are usually slightly built, delicate women, who during the years of development suffered from chlorosis, who in adult life were troubled with anæmic symptoms, and in whom the menopause was ushered in by very severe losses of blood; sometimes, again, they are women who throughout their sexual prime have been accustomed to menstruate very abundantly, who have had numerous and severe deliveries, or who have had frequent miscarriages—it is in those who have thus been weakened by frequent and profuse hæmorrhages, that the symptoms of cardiac failure ensue at the climacteric period. The women thus affected also frequently suffer from palpitation of the heart; the pulse is abnormally frequent, small, low, and easily compressible, and sometimes intermittent or arhythmic. The heart's action is weak and devoid of energy. The heart-sounds are usually obscure, and sometimes a systolic murmur is audible. The patients are short of breath and are subject to attacks of cardiac asthma, not infrequently associated with angina pectoris. In conjunction with these symptoms, we see signs of venous congestion: sudden attacks of coldness in the hands and feet, often also œdema of the feet; the urine at times contains albumin. The hæmoglobin-richness of the blood is always notably diminished. I need not discuss in further detail the well-known symptoms of cardiac insufficiency, and I need only insist that when these symptoms are met with in women at the climacteric, it is of the greatest importance, alike from the prognostic and from the therapeutic standpoint, to make a careful examination of the reproductive organs, so as to determine the exact source of the recurrent

bleedings which usually constitute the primary cause of the patient's sufferings.

In several cases of this kind, I found that the haemorrhages were due to a relaxation of the uterine tissues, and that this relaxation was itself referable to intra-pelvic circulatory disturbances, dependent upon obstruction in the vena cava inferior, whereby the venous return from the pelvis was rendered difficult, and an engorgement of the uterine vessels was brought about.

In some instances of cardiac failure at the menopause, chronic inflammation within the pelvis is to blame for the menorrhagia upon which the cardiac failure depends. Often, again, the haemorrhages are referable to vasomotor influences, such as are liable during the menopause to affect various vascular areas. In other cases, the recurrent bleeding is due to retroflexion of the uterus, to prolapse of that organ, or to tumor, it may be myoma, polypus, or carcinoma.

Finally, during the menopause, more especially in women in whom menstruation has continued up to or beyond the fiftieth year, or in those who have given birth to a large number of children or have lived lives of severe bodily exertion, cardiac troubles may arise dependent upon arteriosclerosis of the great vessels. The signs of such changes in the walls of the blood-vessels are clearly marked: the cardiac impulse is heaving, the second sound of the heart is accentuated; the pulse is full and large, usually giving a very powerful blow to the examining finger, whilst its sphygmographic tracing exhibits characteristic signs in the exceptional height and great distinctness of the first predicrotic elevation. The subjective troubles are in these cases very severe; dyspnoea and attacks of asthma or of vertigo are common, and sometimes albumin may be found in the urine.

We may thus summarize the cardiac disorders met with at the menopause, and more or less directly dependent upon the changes undergone by the feminine organism at that period of life:

1. Paroxysmal tachycardia, a reflex neurosis due to the climacteric changes in the ovaries.

2. Nervous palpitation in women who were similarly affected at the time of the menarche, and in whom the trouble is merely the expression of a very unstable nervous system, and one influenced with especial readiness by impressions proceeding from the reproductive organs.

3. Cardiac disorder due to the obesity so commonly occurring as a part of the general metabolic changes of the menopause, but more particularly dependent upon a deposit of fat in the neighborhood of the heart itself.

4. Symptoms of cardiac failure, due to excessive losses of blood at the menopause, either as an exaggeration at this time of menstrual processes, or as a result of some actual disease within the pelvis.

5. Cardiac disorder in women in whom the menopause occurs at an unusually advanced age, and dependent upon arteriosclerosis.

Particular consideration must be given to a symptom not infrequently occurring in association with the cardiac troubles of climacteric women, and referable to the circulatory disturbances characteristic of this period of life, namely, vertigo. The attack in some cases comes on without apparent cause, in others it occurs on the performance of some unusual movement or the adoption of some peculiar posture (stooping, or the like); the patient is suddenly seized with a sense of rotation, either of her own body, or else of her visible and palpable environment; with this is associated a

sensation of disturbance of equilibrium, flickering before the eyes (*muscæ volitantes*), tinnitus aurium, palpitation of the heart, increased frequency of the pulse, which may be either full or small, redness or pallor of the face, coldness of the hands and feet, muscular twitchings, a sense of great anxiety, and the outbreak of a cold perspiration. The vertigo occurs in paroxysms, usually of short duration—a few minutes to a quarter of an hour. It is especially plethoric and obese women who are liable at the climacteric to suffer from this disorder.

A somewhat similar condition is described by Tilt under the name of "pseudo-narcotism," as frequently occurring in climacteric women. Tilt, indeed, states that in 500 such women, he noted its presence in no less than 277.

Many hypotheses have been promulgated to account for the vertigo that so frequently occurs at the menopause. Both anaemia and hyperæmia of the brain have been assumed as causes, alike dependent upon the irregularity of menstruation, which is supposed to have a reflex influence upon the cerebral circulation. Others regard the vertigo as a climacteric neurosis, since it occasionally occurs before the menstrual irregularities begin, and in such cases a reflex disturbance of the cerebral circulation cannot be supposed to have arisen. According to Matusch, climacteric vertigo is a manifestation of epilepsy—an explanation which has been often extended to include all the menstrual psychoses. Windscheid believes that in many of the cases the vertigo is to be explained by the existence of arteriosclerotic changes in the blood vessels, such as are already by no means rare at the age at which the menopause usually occurs; whilst in other cases, he believes, the vertigo is to be regarded as one of the symptoms

of a nervous disorder. That in any case the vertigo is dependent in some way upon the changes that occur in the reproductive organs at the climacteric period, is shown by the fact that after the final cessation of menstrual activity the patient, as a rule, ceases to suffer from this symptom.

To the circulatory disturbances consequent upon the menopause we must also refer ardor fugax, fugitive heat, the sudden rushes of blood to which women are prone at this period of life.

The cardiac troubles of the menopause are seen especially in women in whom the cessation of menstruation occurs quite suddenly, and in those in whom menstrual activity ceases at an exceptionally early age. It would seem that in such cases, owing to the continuance of periodic maturation of the graafian follicles associated with congestion of the intra-pelvic organs, in the absence of the periodic relief to that congestion afforded by the menstrual flux, there results a summation of stimuli, whereby the accelerator nerves of the heart are very powerfully affected.

Thus, I had under my care a lady from Smyrna, 36 years of age. She had begun to menstruate when 12 years of age and menstruation was always scanty; she married when 15 years old, and finally ceased to menstruate when 19 years of age; she was sterile, and no abnormality could be detected on physical examination of her reproductive organs. Every month she suffered from severe paroxysmal tachycardia, with dyspnœa, rush of blood to the head, perspiration of the face, etc.

In another case, that of a woman 45 years of age, menstruation, hitherto regular, was suddenly suppressed, during the flow, in consequence of a severe fright. The next month the flow failed to appear at the usual time, but instead the patient was affected

with severe cardiac distress, accompanied by sudden sensations of heat in the face, palpitation of the heart, and vertigo; these symptoms lasted for several days, and since then have recurred at intervals of three or four weeks.

The cardiac troubles of the menopause are seen with especial frequency in women who were affected with similar disturbances at the time of the menarche. Experience clearly shows that a certain connection exists between the manifestations that accompany the commencement of sexual activity, and those that accompany the decline and extinction of that activity; and a physician will rarely be mistaken if he bases on the fact that the general health was or was not seriously affected at the age of puberty, a prognosis that the course of the climacteric will be an unfavorable or a favorable one, respectively. In other words, in women whose nervous system is an unstable one, and in those with hereditary predisposition to the occurrence of cardiac disorder, the changes that take place in the reproductive organs both during the menarche and during the menopause, are likely during these vital phases to arouse reflex disturbances of the cardiac functions. The facts thus noted are analogous to those observed by Potain, who distinguishes a peculiar form of chlorosis, occurring in delicate individuals at the age of puberty, and, though apparently cured during the menacme, recurring in its primitive severity at the time of the menopause.

Again, women with a sanguine and erethistic temperament are more inclined to suffer from cardiac troubles at the menopause than women of a tranquil temperament and those endowed with an unimpressionable nervous system.

Finally, elderly virgins, women who have for many

years lived in chaste widowhood, sterile women, women who have married shortly before the menopause, or who at this time have recently been delivered, are all more inclined to the cardiac troubles of the climacteric period than women whose sexual life has been of a less abnormal character.

In the literature of the subject, we find numerous references to the fact that among the disorders of the climacteric, circulatory disturbances play a part. But a full and accurate account of these disorders is lacking alike in the literature of gynecology and in that relating to diseases of the heart—and this is true even of the most recent publications.

Among striking individual cases, one recorded by Moon may be mentioned here, a case of tachycardia consequent upon a sudden menopause: "In a woman 35 years of age the menses were suppressed owing to chill; the pulse-frequency increased from 80 to 200, without any apparent change in the heart or its valves; the symptom lasted for several days, when menstruation became once more established, and the pulse-frequency fell again to the normal."

Tilt expresses the opinion that the heart is but little involved in the disturbances of the climacteric, his experience coinciding with that of Quain. Boerner and Glaevecke, on the contrary, describe the heart troubles of the climacteric in terms very similar to those employed by myself.

A. Clément describes a peculiar form of disturbance of the functions of the heart at the climacteric period, to which he gives the name of *Cardiopathie de la Ménopause*, and of which he has seen four cases. The age of his patients varied from 46 to 50 years. They were all vigorous women, free from hysterical symptoms, and they had never suffered from rheuma-

tism nor from any functional disturbance of the heart. In all these cases the cardiac disorder occurred at a time of life when menstruation still continued, but had already become somewhat irregular. Usually the trouble in question makes its first appearance during the flow, or, if occurring independently of menstruation, becomes more severe at that time. Prior to the development of the actual heart symptoms, we observe for a time, two or three months it may be, signs of general exhaustion and weakness. Then occurs an attack of palpitation of the heart, rapidly succeeded by faintness, sense of precordial anxiety, and dyspnœa. During repose the patient does not usually suffer from any difficulty in breathing, but sleep is apt to be disturbed by paroxysms of palpitation and severe precordial anxiety. As the disease advances, dyspnœa is observed on the slightest exertion. Ultimately, the symptoms mentioned, palpitation, precordial anxiety and dyspnœa, become permanent, but are less severe when the patient is at rest. Constant now is also the feeling of weakness and faintness, which from time to time increases to actual syncope with complete loss of consciousness, and coldness of the entire surface of the body. Examination of the heart gives negative results. The cardiac impulse is a little stronger than normal; the cardiac rhythm may be either regular or irregular, but actual intermission of the beats does not occur. The heart-sounds are pure, there is no murmur; the first sound, if altered at all, will be stronger, not weaker, than normal. Neither swelling of the jugular veins nor venous pulsation is to be observed.

The most striking symptom of heart affection, indeed the only positive physical sign, is the great increase in the frequency of the heart's action, the pulse-rate often being as much as 150 or 160 per minute, and in addi-

tion weak and somewhat variable in strength. At the outset of the disease, no œdema of the lower extremities is to be observed, and it only appears after three or four attacks. In all the patients the extreme pallor of the face is a striking feature. An increased quantity of urine is eliminated. The course of the disease is characterized by a series of successive paroxysms, separated by periods of almost complete remission. At first, these remissions last for a month or two, but they gradually become shorter and shorter, whereas the duration of the attacks continually increases, until it is as much as seven or eight days. At this stage, disturbance of digestion ensues, the appetite is lost, and the general vigor declines. Recovery ultimately occurs, but very gradually. Clément refers the disease to a profound disturbance of the cardiac innervation through the sympathetic nerves, but believes that anæmia constitutes a contributory cause of the cardiac disorder.

Kostkewitsch has made observations regarding the influence of the climacteric upon previously existing heart disease, and has thereby been led to conclude that the influence is unfavorable. The functional disturbances of the cardio-vascular apparatus which commonly accompany the menopause, readily lead, should organic heart disease exist, to the onset of severe cardiac weakness, which may have a rapidly fatal termination. In 55.5 per cent. of the women who enter the climacteric period with organic disease of the heart, the menopause gives rise to a failure of compensation. Such failure of compensation is especially likely to occur in women suffering from valvular insufficiency; it is least probable in cases of arteriosclerosis without valvular defect. The symptoms of defective compensation—dilatation of the heart, increased frequency

of the pulse, arrhythmia cordis, etc.—are manifested especially during the menstrual flow.

Diseases of the Digestive Organs

The congestions which, as we have already pointed out, constitute the pathological basis of the majority of the disorders of the climacteric, manifest themselves in the abdominal organs in the well-known form of plethora abdominalis, chronic venous congestion of the gastric and intestinal mucous membrane, hyperæmia of the liver, hyperæmia of the mucous membrane of the bladder, catarrh of the bladder, distention of the hæmorrhoidal veins, and the various symptoms dependent upon these several forms of congestion.

Bleeding from the hæmorrhoidal veins and chronic diarrhœa are two of the troubles proceeding from the above-mentioned congestion of the intra-abdominal vessels, which occur so frequently during the climacteric period that since the days of antiquity they have been regarded as critical manifestations of the menopause, the object of which is to afford a vicarious outlet for the menstrual flux, now become irregular and intermittent. It can, indeed, be readily understood that a discharge of blood and an increased secretion from the mucous membrane of the lower part of the intestine may, if not too violent, exercise a favorable influence upon the congestive states of the climacteric, by relieving the distention of the abdominal vessels—by a local blood-letting which regulates the disordered circulation. In this way, even though we have ceased to regard it as a “critical” manifestation, hæmorrhoidal bleeding, accompanied by an increased secretion from the intestinal mucous membrane, may at the climacteric period have a distinctly favorable influence upon a woman's general condition.

Hippocrates already in his aphorisms pointed out the salutary effect of epistaxis and of diarrhoea in women suffering from suppression of the menses. Other authors have assigned a critical significance to diarrhoeas occurring at the climacteric, and have warned against their suppression. According to Tilt, diarrhoea occurred in 12 per cent. of all women of this age coming under his observation; in 4 per cent. of the climacteric women, this diarrhoea recurred at regular monthly intervals, whilst in 8 per cent. the recurrence was irregular. In 500 women during the climacteric age, Tilt observed the following abdominal disorders:

Swollen haemorrhoids in.....	62 cases
Diarrhoea in	60 cases
Enduring disturbance of the biliary secretion in.....	56 cases
Bleeding haemorrhoids in.....	24 cases
Intestinal haemorrhages in.....	20 cases
Icterus in.....	6 cases
Haematemesis in.....	4 cases
Monthly intestinal haemorrhages in.....	2 cases
Monthly bleeding from haemorrhoids in.....	1 case

In my own observation, constipation is more frequent in climacteric women than diarrhoea, the constipation being also a symptom of abdominal congestion. Sometimes, when diarrhoea occurs, it is really secondary to constipation. The accumulation of the faecal masses stimulates the intestinal mucous membrane, and gives rise to a profuse aqueo-mucous secretion; the firm faecal masses are then liquefied, the intestinal wall is lubricated, and the constipation gives place to diarrhoea lasting perhaps for several days. This is the explanation of many cases in which there is a periodic recurrence of diarrhoea.

Dyspeptic disturbances are rarely absent during the climacteric period. Most often we see disordered appetite, sluggish digestion, pyrosis, eructation, at times

nausea and retching, and actual vomiting of a watery or bilious fluid. Occasionally, an abnormal sensation of hunger follows each meal, associated, however, with a feeling of distention of the stomach. A very distressing symptom is an excessive formation of gas within the intestine. At times such meteorism is extreme, and it then gives rise to very severe abdominal pain. The gas is evacuated slowly and with difficulty, the patient is compelled to loosen all her clothing; more especially after a meal she is compelled to take off her stays and undo all the bands of her petticoats and skirt. At the same time we see difficulty in breathing and tachycardia. Such an accumulation of gas within the abdomen may give rise to serious errors in diagnosis, the swelling being attributed to pregnancy or to abdominal tumor.

Noteworthy also at the time of the menopause is the occurrence of vomiting, either as an isolated symptom, or in association with some other well-known climacteric disorder. When this vomiting is associated with some unmistakable form of excessive secretory activity (hyperhydrosis, etc.), we may readily suppose that the vomiting is due to undue secretory activity on the part of the gastric mucous membrane. An excessive production of gastric juice, perhaps altered in quality as well as quantity, combined with some other disorder of gastric innervation (hyperæsthesia, or hyperkinesia) will sufficiently explain the occurrence of the sometimes excessive vomiting, even though in many of the cases there may be no reason to suppose that there exists any primary stimulation of the vomiting centre. In other cases, however, it is probable that the trouble is really due to a primary disorder of that centre; and a careful study of the clinical features of the case will be needed to show how far there may

be associated with this other disorders of gastric innervation (Boerner).

Disturbances of the biliary secretion, icterus of greater or less severity, are by no means rare manifestations of the abdominal congestion of climacteric women, and such disorders have also been regarded as vicarious processes originated by the cessation of the menstrual flux (Aran, Bennet, Henoch, and others). Frerichs also has pointed-out that with the cessation of menstruation at the climacteric we not infrequently observe swelling of the liver, which disappears when, after a considerable period, the menstrual flow recurs—a sequence of symptoms which may be repeated again and again for a considerable time.

Diseases of the Skin

The most characteristic symptom of disorder of the skin met with at the climacteric period—one which, indeed, may be said to be never absent—is ardor fugax, fugitive heat; and scarcely less common is hyperhydrosis, an excessive secretion of sweat. Almost invariably, at the commencement of the menopause, women complain of a feeling of burning heat, rising up from the breast to the face; and if they are kept under observation we see from time to time a sudden redness of the face, and sometimes also of the neck and chest, associated with the outbreak of a thin perspiration. Moreover, in nearly all climacteric women, we notice an increased secretion of sweat over the whole surface of the body, and at times this secretion is extremely profuse.

In association with these symptoms we often see the hyperæmic processes in the skin known by the names of erythema and roseola, taking the form of larger or smaller bright red patches, which are most frequently

seen on the sides of the neck, the front of the chest, and the face.

In many women, at the menstrual periods, when the flow has become scanty or has already entirely ceased, we observe the occurrence of eczematous eruptions, which have for this reason received the distinctive name of climacteric eczema. In the majority of these cases, the eczema does not make its appearance until the regular menstrual flux has completely ceased to occur; and in the less common cases in which the flow persists after the climacteric eczema has begun, menstruation is rarely regular, but has begun to exhibit the variability and disorder characteristic of the time of the menopause. If the eczema comes on after the menopause is completely established, it usually appears in from six to twelve months after the cessation of the flow; but in some cases, the eruption appears very soon after the menopause, whilst in others, its onset may be delayed for as long as four or five years. Climacteric eczema is obstinate, and shows no tendency to spontaneous cure. With regard to the localization of the eruption, Bohn found that in three-fourths of the cases it affected the hairy scalp and the ears; Rayer and Hebra also state that the eczema of the menopause is most frequently seen in these two situations, whilst the next commonest site for the eruption is the face. As regards other parts of the skin, it is only that of the extremities that is ever affected by this disease, especially the hands and the fingers, less often the forearms or the backs of the feet; it never appears on the trunk. With regard to the types of eczema occurring in connection with the menopause, we see almost exclusively the squamous and the weeping forms of the disease.

In general, at the climacteric period, the skin is ex-

tremely sensitive, and devoid of powers of resistance to outward noxious influences. Alternations of dampness and dryness or of heat and cold readily give rise to redness, infiltration, and the formation of scales and fissures of the skin; sometimes this occurs merely after cold ablutions. These acute stages of swelling, redness, and vesiculation of the skin readily pass on into chronic and obstinate dermatitis.

Not infrequently, during the climacteric, as during the menarche, inflammation of the sebaceous glands occurs, acne, at times accompanied by seborrhœic manifestations. In other cases, we see disfigurements of the face in consequence of vascular dilatations, especially on the nose and on the adjoining portions of the cheeks, rosacea, in which disease also there is associated inflammation of the sebaceous glands. Another disorder of the skin of the face which is greatly dreaded by women at this time of life, owing to the unsightly appearance it produces, is the development of sinuous dilatations of some of the superficial vessels, at times associated with connective tissue proliferation in the form of red or violet-colored painless nodules.

'An extremely distressing affection, and one which is especially apt to attack women during the change of life, is the previously mentioned pruritus genitalium. The itching is in some cases confined to the external genital organs, whilst in others it extends into the interior of the vagina; also it may pass backward over the perineum, and on into the gluteal folds. In some cases, some local pathological condition will be found to account for the disorder: catarrh of the vagina or of the cervix uteri; displacements, inflammations, or new-growths of the uterus; anomalies of the ovary, the bladder, or the urethra. Cohnstein draws attention to a circular hyperplasia of the vaginal portion of the

cervix, occurring during the menopause, and, "owing to the vascular dilation by which it is characterized, possessing close analogies with haemorrhoids"; the worst symptom of this affection is pruritus. That in these cases the pruritus is actually dependent upon the "haemorrhoidal hyperplasia" of the portio vaginalis, Cohnstein considers to be proved by the fact that, whilst local applications give no more than momentary relief to the itching, this symptom is completely relieved by the abstraction of blood from the cervix. But in addition to such cases as these, we have from time to time to deal with patients suffering from violent genital pruritus during the climacteric period, in whom we shall vainly seek for any local pathological changes, to the cure of which our therapeutic zeal may be directed. Analogy with some other disorders of the climacteric leads us to conclude that in these cases also we have to do with an idiopathic neurosis (Boerner).

The frequent recurrence of pruritus vulvæ leads ultimately to the formation of nodules and papular eruptions.

Many authors state that they have observed the frequent occurrence of erysipelas during the climacteric period; others assert that furunculosis, prurigo, urticaria, and herpes zoster, are seen with especial frequency at this period of life.

Tilt, in his 500 cases of women at the climacteric age, made the following observations:

201, or 40.2 per cent., suffered from heats and tendency to perspiration.

2, or 0.4 per cent., suffered from monthly recurrence of periods of perspiration.

84, or 16.8 per cent., suffered from profuse perspirations.

13, or 2.6 per cent., suffered from cold sweats.
14, or 2.8 per cent., suffered from dry heats (dry flushes).

186, or 37.2 per cent., remained free from such attacks of heat or perspiration.

Krieger gives as an example of the "occurrence of new troubles" at the change of life, furunculosis; so also does Boerner. "The discoloration of the face, occurring usually in connection with pregnancy or with diseases of the reproductive organs, and known as chloasma uterinum, has been seen by Cohnstein, during the climacteric period, "chiefly in cases in which, owing to some degree of failure of general nutrition, the skin has been thrown into folds." Wilson regarded prurigo and eczema as the commonest skin diseases of the climacteric period; whilst Boerner draws attention to a connection between climacteric conditions and the outbreak of herpes zoster.

Disorders of Metabolism

Among the disorders of metabolism to which women are especially prone at the climacteric period, we must in the first place allude to obesity (lipomatosis universalis), and to gout (arthritis urica).

Numerous observations have shown us that the time of the change of life, the period between the ages of 40 to 50 years, is the one especially favorable in women to the extensive deposit of fat in the tissues.

In 200 cases of great obesity (lipomatosis universalis) in women, in which I instituted inquiries regarding the age at which an excessive deposit of fat in the tissues had first been noticed, I obtained the following results:

In early childhood in.....	19 cases
At the age between 15 and 20 years in.....	30 cases
At the age between 20 and 30 years in.....	45 cases
At the age between 30 and 40 years in.....	52 cases
At the age between 40 and 50 years in.....	54 cases
At ages over 50 years.....	0 cases

We learn from these figures that it is between the ages of 40 and 50 years that there is the greatest tendency in women for the accumulation of fat; but that as early as between the ages of 30 and 40 years this accumulation may in many instances begin. Speaking generally, there is in women an obvious connection between the development of obesity and the state of the reproductive functions, inasmuch as at puberty, during the puerperium, and above all at the climacteric, there is a special tendency to the accumulation of fat in the subcutaneous tissues. At the commencement of the menopause it is more especially in the abdominal wall, the breasts, and the buttocks, that we witness the deposit of fat. In the abdomen, owing to thickening of the subcutaneous tissues and of the great peritoneal folds—especially of the great omentum—a marked protrusion occurs, whilst the umbilicus becomes more deeply hollowed, and ultimately funnel-shaped. In some instances, the deposit of fat around the navel favors the occurrence of umbilical hernia. After an artificial menopause, induced by oophorectomy, it has also been noticed in from 42 to 52 per cent. of the cases that a marked general deposit of fat has occurred, affecting especially the breasts and the buttocks.

This obesity in climacteric women, not only impairs to a serious extent their good looks, but brings in its train a number of troubles, and gives rise to manifold morbid manifestations, and among these, changes in the heart, which may readily threaten the patient's life. In consequence of extensive fatty deposits in the myo-

cardium, associated with actual fatty degeneration of the muscular fibres, cardiac insufficiency ensues, with all its distressing and disastrous consequences. It is further necessary to insist upon the fact that obesity during the climacteric very definitely favors the occurrence of menorrhagia.

On examining 282 women, 5 years after the complete cessation of the menstrual flow, Tilt found that 121 had become stouter than before, 71 were unchanged in this respect, and that 90 were thinner than formerly.

Alike in the third class and in the first were a very large proportion of women in whom the change of life had entailed much illness and suffering; but in the first class, the women who had been thus affected had at that time lost weight, and only in the latter half of the climacteric period, when their troubles had become less severe, had the condition of embonpoint made its appearance.

Passing now to the consideration of arthritis urica in women at the climacteric, it is worthy of mention that Hippocrates was so much struck by the association that he went so far as to deny that gout occurred at all in women before the menopause. The fact of the matter is that whilst women are in general less disposed than men to the occurrence of gout, the tendency of women to this disease during the climacteric period is so marked, that at this epoch of life the disease is far more common in women than it is in men of corresponding age.

It is in obese women, with a soft, white, and lax integument, with a pallid, somewhat bloated countenance, a poorly developed muscular system, extensive varicosities of the veins of the legs, marked dyspeptic troubles, and habitual constipation, that during the pre-climacteric and climacteric periods, gout is especially

apt to make its appearance. It is then characterized by the following symptoms. From time to time the woman suffers from tearing or shooting pains in the joints, lasting at first a short time only, and returning after longer or shorter intervals. With the frequent return of the pains, the affected joints become swollen; and finally the patient suffers from the characteristic attacks of acute gouty arthritis, with the well-known consecutive symptoms of this affection.

According to the observations of Geist, during the climacteric period, 28 women suffer from gout as compared with four men of corresponding age. Tilt publishes the following figures showing the mortality of women from gout in England:

At ages from 20 to 30 years.....	56 women
At ages from 30 to 40 years.....	121 women
At ages from <u>40</u> to <u>50</u> years.....	<u>291</u> women
At ages from 50 to 60 years.....	152 women
At ages from 60 to 70 years.....	104 women

Regarding diabetes mellitus during the menopause, Lawson Tait, who maintained there was a distinct form of climacteric diabetes, asserted that this disorder of metabolism was less severe, and runs a longer course during the climacteric period than at other times of life.

Diseases of the Nervous System

The disturbances of the nervous system that occur during the climacteric period, manifest themselves chiefly in the form of hyperæsthesia and hyperkinesia. The sensory nerves appear to me for the most part to be more irritable than normal, inasmuch as every stimulus by which they are affected arouses a comparatively greater sensation, and gives rise to an excessive reaction in the sphere of consciousness. The cutaneous

hyperæsthesia of climacteric women is shown in very various ways, the commonest being the anomaly of sensation, which gives rise to the symptom known as pruritus, characterized by paroxysms of itching in more or less extensive areas of skin, with consecutive nutritive changes in the affected portions of the integument. The commonest and the most distressing form of this disorder during the menopause is *pruritus vulvæ*.

In addition to such manifestations of cutaneous hyperæsthesia, vasomotor disturbances of the skin are of frequent occurrence, characterized by redness, rise of temperature, and sometimes the formation of nodules in the affected areas. Almost without exception, at the outset of the climacteric period, and sometimes also in the preclimacteric epoch, women complain of a very distressing feeling of fugitive heat in various portions of the surface of the body, manifested objectively by the rapid appearance and no less rapid subsidence of a red coloration of the skin of the face, the neck, and the chest. Such fugitive heats are due to disturbances of vasomotor innervation giving rise to sudden variations in the amount of blood passing through the vessels of the affected areas of skin.

Hardly less frequent during the climacteric are the sensations of imaginary movement which give rise to the subjective symptom known as vertigo. Often in women at this time of life it occurs quite without apparent cause, but in other cases on the performance of some unusual movement or the adoption of some unusual posture; there is a sudden perception of rotatory movement, either of the patient's own body or else of her visible and palpable environment. With this feeling of disturbed equilibrium, there is often associated optical and auditory hyperæsthesia, flickering

before the eyes (*muscæ volitantes*), tinnitus aurium, painful sensations in the head and more especially in the occipital region, nausea, vomiting, sense of anxiety, cold sweats, muscular twitchings, alternating redness and pallor of the face, and coldness of the feet. The vertigo occurs in paroxysms, usually of short duration, varying from one to fifteen minutes. It is especially in plethoric and obese women that climacteric vertigo occurs.

A peculiar form of this climacteric vertigo is that described by Tilt under the name of "Pseudo-Narcotism" of climacteric women, characterized by a sense of swimming movements, uncertainty in the gait, vacancy of expression, a confused look in the eyes like those of a drunken person, and a kind of mental stupor which the patient cannot shake off without considerable effort. The women thus affected state that they feel as if they had had too much to drink, as if something had gone to their heads; indeed, their great fear is that they will be supposed to be intoxicated by those who see them walking in the streets; they feel even that they must refuse to receive the visits of their acquaintances if they wish to preserve their reputation for sobriety. They suffer also from great drowsiness, from a disagreeable sense of weight or pressure in the head, from a feeling "as if the brain was clouded, or needed to have some cobwebs swept away." They feel a disinclination to both mental and physical exertion, and their memory and all other intellectual powers are impaired.

Boerner maintains that the attacks of vertigo so frequently occurring at the menopause are in a minority of cases only dependent upon hyperaemic states (arising from the cessation of the menstrual flow); on the contrary, he believes that the cause more often lies in

hysteria, in chronic disorder of the digestive tract, or, finally, in anaemia. In his opinion, vertiginous attacks dependent upon cerebral anaemia are very common indeed during the climacteric period, and even for a long time afterward; and he believes that their nature is often completely misinterpreted.

'Another very unpleasant indication of disordered nervous function during the climacteric period is the sleeplessness that is so common at this time of life. Women who during the daytime feel comparatively well, suffer at night, sometimes periodically at exactly the same hour night after night, from a state of general restlessness, and for this reason are unable to obtain the sleep for which they long. They throw themselves uneasily from side to side of the bed, or wander restlessly about the room, and before long, owing to this want of sufficient repose, become greatly depressed.'

Among the neuroses of the sensory apparatus, the various kinds of cutaneous neuralgia are less common than during the menarche and the menacme; but on the other hand, in my personal experience at any rate, the visceral neuralgias are commoner, more especially cardialgia and hypogastric neuralgia. Of the superficial neuralgias, hemicrania and intercostal neuralgia are those which occur most often during the climacteric period.

During the change of life, hemicrania most commonly occurs in typical association with menstruation; or, if the flow has already ceased, the attacks of hemicrania recur at what should be the menstrual periods. This affection is characterized by the paroxysmal occurrence of a severe boring pain in the side of the head, more often the left side than the right, affecting the temporal, the parietal, or the occipital region, or the entire side of the calvaria at once, usually accom-

panied with redness and local rise of temperature of the painful part; the duration of the paroxysms varies in different cases from one or two to many hours; with the pain are associated chilliness, nausea, exhaustion, and a severe feeling of general malaise.

Of the intercostal neuralgias, one form deserves especial mention in this connection: I refer to mastodyn ia, which is both physically and mentally one of the most distressing afflictions to which women are subject during the climacteric period. For a middle-aged woman suffering from mastodyn ia—the "irritable breast" of Cooper—almost invariably feels assured that these pains localized in the breast and its immediate vicinity are indications of a commencing cancer of the breast; and it is an exceedingly difficult matter, in most cases, to convince her that her fears are without foundation. In this manner, partly in consequence of the directly depressing effect of the pains, which are commonly intensely severe, and partly owing to the disturbance of mind produced by the belief that an incurably fatal disorder has begun, I have in several instances seen cases of profound melancholia originate.

According to Windscheid, among the enduring painful sensations of the climacteric period, pains in the lower extremities are of somewhat frequent occurrence. Day after day the patient suffers from distressing tearing or lancinating sensations in the legs; the trouble is insusceptible of more exact description, but is none the less a very severe one. In addition to the lower extremities, the back, the spinal column, and more particularly the lumbo-sacral region, are often the seats of incessant pain. In the thoracic region of the back, the pain is usually diffuse; when confined to the spinal column, however, it is commonly limited to individual vertebræ, the spinous processes of those affected being

also sensitive to pressure. The sacral pains may in some cases predominate to such an extent, that it is on this ground alone that the patient comes to seek medical advice. The sacrache is equally severe when the patient is standing, sitting, or recumbent; it often radiates into the lower extremities. Boerner draws attention to the fact that in many cases the pains in the sacrum or higher up in the back may be due to excessive tension of the abdominal parietes in consequence of the great accumulation of fat. Among motor manifestations, Windscheid draws especial attention to a certain degree of weakening of the muscles of the lower extremities. Although on examination no abnormality can be detected, fatigue and functional incapacity, more especially in the lower extremities, ensue in a manner altogether disproportionate to the exertion, so that the patient is most unwilling to take even a short walk, to go upstairs, etc. In pronounced cases, the patient will never go out walking without carrying a campstool, so that she can sit down to rest directly she begins to feel fatigued. In association with these disorders of motility we most commonly see the above-mentioned painful sensations in the legs, and by these latter the functional incapacity of the lower limbs is of course increased. Weakness of the arms is far less frequently observed; but occasionally we hear complaints that on the performance of domestic duties, needlework, etc., which previously could be carried out quite easily, the arms and hands are now speedily fatigued, and rendered functionally incapable.

Of the visceral neuralgias, cardialgia is by no means rare during the climacteric period; the pain is concentrated in the epigastric region, but not infrequently radiates to the back and to the chest. Hypogastric neuralgia is also not uncommon, pain in the lower part

of the abdomen, associated with a sense of pressure in the bladder, the uterus, and the rectum, and sometimes radiating to the thighs and to the region of the hæmorrhoidal nerves.

The opinion expressed by several authorities, that the menopause favors the occurrence of cerebral apoplexy, must, according to Windscheid, be received with caution; we have to remember that with advancing years atheromatous changes are apt to occur in the cerebral arteries, and it is to these changes, altogether independently of the climacteric, that cerebral hæmorrhage is due. It appears, however, to be a fact that the menopause favors the onset of progressive paralysis. According to Jung, 60 per cent., and according to von Krafft-Ebing, 27 per cent., of women affected with paralysis were first affected in this way during the climacteric period. Von Krafft-Ebing explains this occurrence by the fact that during the menopause fluxions of vasomotor origin are common, and these serve as the starting-point of transudative processes.

Among the neuropathic manifestations of the climacteric period we must reckon the at times excessive increase of the sexual impulse. We have already insisted upon the fact that the sexual impulse is not normally extinguished in women at the time of the cessation of menstruation; on the contrary, sexual desire commonly persists long after the menopause, and on this fact is largely dependent the frequency with which elderly women espouse quite young men. But in some cases, the sexual impulse is enormously enhanced during the climacteric period, and the patient experiences paroxysms of intense voluptuous sensation, associated with manifestations of abnormal reflex and psychical reaction, with increased frequency of the pulse and the respiration, emotional excitement, it may

be loss of consciousness, and even general convulsions. Some of these cases of disordered sexuality occur in those previously affected with *pruritus vulvæ et vaginæ*.

More particularly Guenceau de Mussy and Boerner have described cases of such excessive libido sexualis during the climacteric period, voluptuous crises with pollutions, occurring independently of any external cause; the women thus affected have a continued succession of erotic ideas, they experience an itching and burning sensation in the genital organs, and from time to time this culminates in a paroxysm of sexual feeling, with orgasm, and increased secretion from the glands of the vulva.

Boerner has observed that characteristic variations in the libido sexualis commonly occur at the climacteric period. Not infrequently at this time the sexual desire becomes greatly diminished in intensity, or even entirely disappears; more often, however, the desire persists throughout this epoch; finally, in many instances, the desire undergoes an increase, at times to a degree amounting to positive torment. The first of these changes, the decline in the intensity of the sexual desire, harmonizing as it does with the general extinction of the sexual functions at the change of life, might have been expected to be the normal occurrence. And it is a fact that in many cases characterized by an increase of libido sexualis at the climacteric epoch, Boerner found that there existed anatomical abnormalities in the reproductive organs (fibromata, flexions, etc.). Be this as it may, an increase in the intensity of sexual desire, as long as that increase is not altogether excessive, may be regarded as one manifestation of the visceral hyperæsthesias so general at this time of life. In the excessive degrees of this affection, however, those in which at times the sexual crisis is

associated with general convulsions, we must, with Romberg, recognize the existence of a direct neuralgic state of the spermatic plexus. It is especially before the commencement of an actual menstrual period, or before a due period which fails to occur, that during the critical years complaint is made of this state of excessive sexual desire and sensibility; and in many instances the trouble begins at the very first appearance of the menstrual irregularities which foreshadow the menopause.

Windscheid draws attention to the fact that occasionally the nervous manifestations may make their appearance prior to the occurrence of any menstrual irregularity, so that it is by the nervous disturbance that the woman or her physician is warned of the approach of the menopause. "When the menstrual anomalies begin," continues Windscheid, "that is to say, at the commencement of the climacteric, the nervous troubles may have already attained their maximum and have begun to decline in intensity. As a general rule, however, the appearance of the nervous disturbances coincides with the commencement of the menstrual irregularities. It may happen that these disturbances are intensified with each recurring period, but this is not the rule. Sometimes, however, we may observe that when menstruation occurs with excessive frequency—a by no means rare phenomenon at the outset of the climacteric—the nervous disturbances become more severe; and especially is this the case when the unduly frequent flow is also abnormally profuse, as indeed often happens." The manifestations of climacteric neurosis occur, as Windscheid rightly insists, most frequently in the sphere of the psyche. "We observe a change in the disposition, which usually becomes more excitable. A woman previously calm and

composed becomes irritable, inclined to emotional disturbance and to fits of temper, and unable to bear with equanimity the pinpricks so frequent in daily life, and especially in the daily life of a housewife. In other cases, however, the disturbance of the psyche is rather in the direction of depression: we observe a kind of spiritual inhibition, a deficiency of vital energy, an indifference to things which formerly gave pleasure. Almost always, also, complaints of loss of memory are among the indications of such depression. To these intellectual anomalies are superadded disturbances of sensibility. There is excessive sensitiveness to bright lights, loud noises, and strong odors. Frequently, also, in such cases, we see great intolerance to alcohol, quite small doses giving rise to extremely disagreeable sensations in the head."

Climacteric Psychoses

The powerful influence which the changes occurring at the climacteric period has in the origination of psychoses, has long been recognized, the menopause, in fact, being a favorable soil for the cultivation of mental disease. The fact is embodied in medical terminology, since many authors speak of "climacteric insanity," assuming that the psychoses of this period of life present a definite and characteristic clinical picture.

In an earlier part of this work it was shown that the process of menstruation has generally a marked effect upon the psyche, and that disturbances of menstrual activity are competent to exercise a pathogenic influence upon the mental condition of the woman who suffers from them; still greater and more intense is the influence of the cessation of menstrual activity, with its powerful and widespread disturbance of the entire organism, with its destructive oscillations of equilib-

rium in the spheres of sensation, perception, ideation, and volition. It is easy to understand how the rarer recurrence of menstruation, the occasional profuse losses of blood, the complete suppression of menstruation, the conditions peculiar to the climacteric period of stasis and congestive hyperæmia of the brain, are competent, more especially in hereditarily predisposed persons, to give rise to the development of psychoses; whilst in those already suffering from mental disorder, the menopause will be likely to bring about an aggravation in their symptoms. At this time of life, also, we have to take into account the effect of certain ideational influences to which allusion has already been made, the thought that womanhood and its joys are passing away for ever, and the fear of the dangers attendant upon this critical period of the change of life. A French proverb alludes to "le diable de quarante ans, si habille à tourmenter les femmes."

Mental disorder will be more likely to ensue at the climacteric period in those women whose nervous systems have always been unduly irritable, and in those affected with hereditary predisposition to insanity. Further, it is more likely to occur in those in whom the menopause takes place quite suddenly, in a catastrophic manner, than in those in whom the climacteric proceeds gradually, and unaccompanied by any stormy manifestations in the organism at large.

It is not, in my opinion, possible to recognize any specific form of mental disorder peculiar to the climacteric period, but nevertheless the psychoses occurring at this time of life do exhibit certain striking and characteristic features, more especially in this respect, that states of mental depression with melancholia predominate, whilst erotic influences are manifest in their etiology. In the slighter forms, volition and ideation

are unaffected, and the trouble manifests itself in the form of hypochondriacal moods, associated with bodily troubles. In more severe cases we see emotional depression, states of anxiety, limitation of the powers of conception and judgment, indecisiveness, low-spiritedness, and apathy; or on the other hand, restlessness, an inclination to continued moving about, the eager pursuit of continually varying occupations, loquacity, etc.; finally, if the mental disorder becomes still more severe, hallucinations, delirium, paroxysms of intense excitement, and in exceptional instances, fully developed mania.

As with regard to the other disorders attending the climacteric, so also in respect of the climacteric psychoses, women who have been or are married, who have had a reasonable number of children, and have been accustomed to a sufficiency of sexual activity, are more favorably situated, are far more immune, than women whose sexual circumstances have been the opposite of those mentioned, who have had one or two children only, who have indulged in intercourse only when protected from pregnancy by the use of preventive measures, or have remained sexually unsatisfied, and, finally, women who have never married, and those who for many years prior to the commencement of the menopause have lived in chaste widowhood. In "old maids," to the somatic effects of sexual abstinence (or in some cases of abnormal sexual gratification), are superadded the effects of the intellectual and emotional recognition of a wasted life. Again, it by no means rarely comes under our observation that women who in youth, at the time of the menarche, suffered from psychical disturbances, are apt once again to be affected with transitory mental disorder at the change of life. Once, however, the menopause is completely at an end, a

condition of mental quiescence is, as a rule, established, and then it may happen that previously existent mental disorders undergo amelioration; but on the other hand we have in all cases to reckon with the possibility that they may take an unfavorable turn in the direction of the development of senile psychoses.

Of considerable interest is the fact, first pointed out by Glaevecke, and subsequently confirmed by other observers, that in cases of artificial menopause, melancholic mental disturbances not infrequently follow the operation, in some instances so severe as to lead to weariness of life and actual suicide; and in general, after the artificial induction of the menopause, psychical disturbances are by no means rare, and are sometimes very severe. Such disturbance of the mental balance is seen after oophorectomy, especially in women who are still comparatively young, and whose sexual powers are still in a ripe state; whereas when the operation is performed in women of a more advanced age, whose ovaries were already nearly or completely functionless, no psychopathic changes are likely to ensue. In women belonging to the former category, the same etiological influences come into operation as in the physiological menopause, the patient, that is, is affected by the psychical influences of the removal of the ovaries—not only by the cessation of menstruation and the disappearance of the internal secretion of the reproductive glands, leading to a disturbance of the physical equilibrium, but also by the intellectual recognition of the loss of sexual potency, and a consequent disturbance of the mental balance.

In Schlager's opinion the climacteric has a potent influence in promoting the development of psychical disturbances in women, even when the involution occurs at the normal age. The course of these dis-

turbances is as follows: soon after the commencement of the process of involution, when for a few months already the menstrual periodicity has been irregular, or the flow has been unduly profuse, a change of disposition makes its appearance, at first hardly noticeable, but after a little time manifesting itself clearly in the form of an increase in irritability. The woman finds fault with everything and everybody, becomes mistrustful, suspicious, full of complaints, imagines that the most insignificant annoyances are due to intentional slights; at the same time she complains of continued sleeplessness, palpitation, various indescribable sensations, and of headache. Occasionally, congestions of the head occur, with alarming dreams, and the moodiness may increase greatly; in this condition three such patients of Schlager's were impelled to attempts at suicide. Schlager further draws attention to the fact that in 22 cases known to him in which suicide was performed or unsuccessfully attempted by women, in eleven of these the patient was at the climacteric age. He believes that the most important etiological influence in the production of climacteric mental disorder in such cases is the sudden suppression of menstruation. In the majority of these instances, the mental disorder takes the form of mania; exceptionally, however, the form of chorea or of catalepsy.

By Tilt the following forms of "climacteric insanity" are distinguished: delirium, mania, hypochondriasis, melancholia, impulsive insanity, and perversion of the moral instincts. The same author publishes the following table showing the age incidence in 1,320 cases of mental disorder in women, from which it appears that during the age of the menopause, a very considerable number of the cases originate, but that after the change of life comparatively few cases occur.

In these 1,320 cases the women were:

Under 15 years of age in.....	9 instances
Over 15 and under 20 years in.....	61 instances
Over 20 and under 25 years in.....	216 instances
Over 25 and under 30 years in.....	223 instances
Over 30 and under 35 years in.....	217 instances
Over 35 and under 40 years in.....	218 instances
Over 40 and under 45 years in.....	162 instances
Over 45 and under 50 years in.....	153 instances
Over 50 and under 55 years in.....	122 instances
Over 55 and under 60 years in.....	57 instances
Over 60 and under 65 years in.....	55 instances
Over 65 and under 70 years in.....	27 instances

Fuchs tabulated the ages of 26,300 insane persons. Reducing his results to the ratios per 10,000, he obtained the following results:

	Women	Men
At ages under 20.....	563	649
At ages over 20 and under 30.....	1,895	2,132
At ages over 30 and under 40.....	2,557	2,614
At ages over 40 and under 50.....	2,180	2,080
At ages over 50 and under 60.....	1,362	1,247
At ages over 60.....	1,443	1,278

According to Esquirol, among 198 women who committed suicide, there were 77 between the ages of 40 and 50 years—a number considerably larger than those in any other age-decade. Among 235 women suffering from dementia, a moiety had first come under treatment during the climacteric age. The same author published the following data regarding the age-incidence of insanity in the case of 6,713 female patients:

At ages under 20 years.....	348 cases
Between the ages of 20 and 25.....	563 cases
Between the ages of 25 and 30.....	727 cases
Between the ages of 30 and 40.....	1,607 cases
Between the ages of 40 and 50.....	1,479 cases
Between the ages of 50 and 60.....	954 cases
At ages above 60 years.....	1,035 cases

Matusch found that among 551 women suffering from mental disorder, there were:

At ages 0 to 10 years.....	9 cases
At ages 10 to 20 years.....	73 years
At ages 20 to 30 years.....	140 cases
At ages 30 to 40 years.....	114 cases
At ages 40 to 50 years.....	107 cases
At ages over 50 years.....	38 cases

According to von Krafft-Ebing, among 858 insane women, there were about 60 in whom the disorder of the mind appeared to depend upon the influence of the climacteric, and in 25 of these there was hereditary predisposition to mental disease.

From Kowalewski's interesting work on the psychoses of the climacteric, we quote the following:

"In women, the climacteric has a distinct influence upon the mental life, and that influence is strongly manifested, more especially in cases in which during the age of puberty mental disturbance had previously been noticed. The mental condition in which women approach the change of life is a very variable one, and it is one largely dependent upon the circumstances in which the active years of the sexual life have been passed. In some cases, a woman has been so fortunate as to marry early and from affection, and her whole married life has been passed without disturbance; her labors have not been exhausting, and her children have enjoyed good health; all have passed through the years of childhood without untoward incident, and their development has been a happy and successful one; in a word—everything has gone well with her and hers. Such a woman will give thanks to God for the rare felicity she has enjoyed; and quietly, patiently, and with understanding, will endure the inevitable end of her sexual life. For such a woman, more especially if she comes of a healthy stock, the changes which

occur in her reproductive organs at the epoch of the climacteric, need not entail any serious shock to her nervous system, nor need they form the culture ground for morbid manifestations in her nervous system or in her mind. Even if any anomalies in nervous working should occur, it will be such only as are aroused by the disturbance of the normal menstrual rhythm; in such cases, they will rarely prove of a serious or enduring character.

"But look, on the other hand, upon this picture. A woman has married without affection and from pure necessity. Her husband has been a drunkard, and rough and unfaithful. She has had a great many children, her labors have been tedious and difficult and accompanied with severe losses of blood. Some of the children fell sick and died; those that survived proved idle, good-for-nothing, and a burden. The family life is dominated by quarrelsomeness, disorder, and insufficiency of means. The mother is affected with some chronic disorder of the reproductive organs, and is hardly ever out of the doctor's hands. After 25 or 30 years of a life of this kind, the woman enters upon the change of life. Physically exhausted, weary of life, never having known happiness, after an existence full of trouble and wretchedness, with nothing joyful either in her memories of the past or in her prospect of the future—the chief hope of such a woman is that her troubles may soon end with her life. Where the soil is thus physically and mentally exhausted, the development of a neurosis or a psychosis is only too probable on the most trifling exciting cause. Her life seems of so little worth, that thoughts of suicide are likely to be very near at hand. Thus, when the climacteric alterations in the reproductive organs are superadded, melancholia is very likely to supervene. When, how-

ever, the case is complicated by hereditary predisposition to insanity, and by the occurrence of actual degenerative changes in the central nervous system, instead of the passive depression of melancholia, we shall rather see the ideas of persecution of the paranoiac. As an actual fact, these two psychoses, melancholia and paranoia are the commonest forms of mental disorder at this period of a woman's life.

"These are the two extremes in woman's mental state at the time when the physical changes of the climacteric period begin in her reproductive organs. It will, of course, be readily understood that between these two extremes lies a series of combinations any one of which may in individual cases occur.

"The conditions of life during earlier years have thus a strong determinative influence in the production of mental disorder; and not infrequently in these conditions alone shall we find the efficient cause of the mental degeneration. At times, the memories of her own life have in a woman at the climacteric age so serious an effect, that these memories alone constitute the casual agent of the development of a psychosis, or at least so influence the soil as to make it a suitable culture-ground for the development of mental disorder, the actual exciting cause of the pathological state being a disturbance of the ordinary menstrual rhythm.

"In considering the mental condition of women at the outset of the climacteric period, we must not forget those who are called 'old maids.' In their youth these maidens also have had their ideals, their hopes, their plans, and their sorrows. They also had a natural impulse to love and to be loved in return; they hoped to become wives and mothers. But life has failed to fulfil their hopes and their wishes, and their longings have remained unsatisfied. Some of them have taken

up their cross without murmuring, and have devoted their talents, their intelligence, and their love to the service of those nearest to them. But others make an active protest against fate in the form of vindictive feelings toward their environment, of quarrelsome-ness, scandalmongering, etc. Here we see contrasted the two principal types of such women. On the one hand are those who devote their intellectual and spiritual powers to the service of society; these are unselfish sisters-of-mercy, untiring medical women, in-valuable school-teachers and governesses, fanatical political agents, etc. Such as these have ceased to live for themselves. In the fullest sense of the words, they mortify the flesh, and guide their conduct by lofty moral principles. They have killed their sexual life, and they remain for ever virgins—both morally and phys-ically. If, owing to a pathological inheritance, faulty conditions of life, exhausting illnesses, etc., a psychosis develops, the hallucinations and delusions from which they suffer very rarely assume a sexual character, nor are they of a degrading type. The sexual side of life seems, in fact, be they sane or insane, to have under-gone complete atrophy. They suffer from simple mel-ancholia with stupor, or their insanity takes a religious turn, but very rarely indeed has it an erotic character.

"Very different is it with old maids of the second type. They are dissatisfied with life, irritable, quarrel-some, envious, and malicious. They are spiteful and revengeful, gossips and scandalmongers, boast of their own chaste and innocent lives, and never forgive any real or imaginary attempt upon their spotless virtue. At the same time they never lose hope for the future, and are full of imaginary love-affairs, in which they pass through scenes by no means chaste or innocent; they do not shrink from self-abuse and the abnormal

gratification of the sexual needs, in which the lacking partner in the sexual act is supplied by the imagination. Under the influence of such abnormal conditions of life, these women frequently become affected by nervous disorders; migraine, neuralgia, céphalalgia, nervous depression, rachialgia, debility, anæmia, diseases of the reproductive organs, etc. Thus, when they enter the climacteric age, the soil is fully prepared for the development of mental disorder, which in such individuals is often characterized by hallucinations of sexual sensation and perception, erotic visual and auditory hallucinations, delusions of similar character, increased sexual irritability, a search for abnormal means of sexual gratification, a propensity to obscene speech and conduct, etc.

"Mental disorder is so common during the climacteric period, that the term 'climacteric insanity' has now become established in the literature of mental alienation. In almost all the text-books of the subject we find an allusion to this form of mental disease, but there is no real ground for Maudsley's assumption that there is a climacteric insanity *sui generis*. At the climacteric, very various forms of mental disorder may occur—paranoia, melancholia, and mania; the only common feature in the attacks, owing to which they are classed as 'climacteric insanity,' being the fact that the final determining cause in each case is the onset of the change of life. In fact, this period is not without influence upon the manifestation of the disease—its stamp is imprinted upon the clinical picture, it endues the disease with certain characteristic features—but still, the peculiarities common to the cases of mental disorder occurring at this time of life in women are not so great as to justify us in describing them as a separate variety of psychosis."

According to Kowalewski, this so-called climacteric insanity is met with in two principal forms: in many cases the mental disorder recurs in periodic paroxysms, associated either with the commencement of the menstrual flow, or having the periodicity of menstruation after the flow has already ceased to appear; in the other class of cases the psychosis has no direct connection with menstruation, and is dependent upon the joint influence of all the manifestations of the climacteric period. Cases belonging to the former class have been distinguished by Bartel as "climacteric pseudo-menstrual insanity."

The psychoses dependent upon the climacteric influences may, according to Kowalewski, appear in almost all the known forms of mental disorder: precordial anxiety, melancholia, mania, amentia, paranoia, etc.; and although they exhibit no features which are absolutely characteristic, or which, as already said, enable us to distinguish a specific "climacteric insanity," yet they all bear a common imprint by means of which we are enabled to detect in their causation the influence of this critical period of life. Thus, precordial anxiety occurs in paroxysms having a more or less regular periodicity, corresponding with that of the expected menstruation. The same feature is observable in the periodic exacerbations of hysterical and epileptic paroxysms. Often, also, there occur at this time sudden changes in the emotional disposition and in the character, in one direction or the other, without the development of actual melancholia or mania. The melancholia of the climacteric period occurs chiefly in married women, more especially in those whose circumstances are unhappy; and it is often manifested by attempts at suicide.

Mania is comparatively rare at the climacteric

period; when it does occur, it commonly assumes a sexual form—sexual impulses, hallucinations, and delusions, and obscene conduct. Such manifestations are seen most often in widows, in "old maids" whose morals are not above reproach, and, speaking generally, in those whose sexual needs have remained partially or completely ungratified, and in those who have greatly erred in the conduct of this side of life. Amentia also occurs at this time of life; rarely in maniacal form, more frequently in association with menstruation as a periodic psychosis, or as a continuous disorder of mind with exacerbations corresponding to the menstrual periods; it is often characterized by pronounced eroticism.

Much more frequent during the climacteric period is the occurrence of paranoia, as Kowalewski rightly insists. It is most often met with in "old maids" with psychopathic predisposition. The imagination of such individuals is always concentrated upon men; they imagine that men in general, but more particularly certain individuals of the opposite sex, are continually regarding them, making eyes at them, making signs to them, in some way or other striving to attract their attention. The most ordinary and invariable forms of polite intercourse are regarded by these women, whose powers of observation are morbidly stimulated, as being indications of a special "attention" paid to themselves. They persecute these men with their own attentions, and imagine that it is the men who are persecuting them. Often this morbid mental state is associated with sexual malpractices, masturbation, etc.

Not rarely, such degenerates are affected with lascivious dreams. Often they experience hallucinations of sexual perception in the form of supposed assaults on their virginity. All these states are apt speedily to

develop into a condition of general suspiciousness and ideas of persecution. The ideas of persecution assume a peculiar form, one especially characteristic of the climacteric period. The patients believe that a man, often personally unknown to them, and perhaps living in another town, enters into spiritual and bodily intercourse with them. These relations are supposed to be effected in most cases by means of spiritualism, hypnotism, or electricity. The patient importunes the man in question with letters, supposes herself to be legally united with him, and not infrequently wishes to give him the pleasure of paying her bills and providing her with money. It is a very common occurrence for a Catholic priest to be worried by such a woman, her delusion being grounded upon the fact that the priest is supposed to assume an exceptionally intimate spiritual relationship with members of his flock. The patient with ideas of persecution often herself becomes an actual persecutor, not only pestering her victim with innumerable letters, but in her jealousy making "scenes" whenever she can encounter him, and sometimes giving rise to serious scandal. With such a mental state we often see associated sexual hallucinations and delusions; the patient believes herself to be pregnant, imagines herself to have been violated, or to be living in carnal intercourse with a man—some one, it may be, with whom she is not even acquainted. Medical men are especially apt to suffer from the accusations of such women, whom they may have examined in private in entire ignorance of the patient's mental condition. Frequently, such ideas of sexual persecution are associated with paroxysms of violent nymphomania, and in this way also the unwary physician may find himself placed in an extremely unpleasant position. It occasionally happens in such patients that abnormalities of the sexual instinct arise, and they

begin to feel desire toward individuals of their own sex.

Such delusions of persecution by means of hypnotism, spiritualism, the telephone, etc., in association with sexual delusions and nymphomania, are so frequent during the climacteric period, that they may be regarded as preeminently constituting climacteric insanity. Frequently some old hysterical state underlies this form of mental disorder.

Thus these peculiar manifestations of eroticism must be regarded as the distinctive characteristics of climacteric insanity and more particularly of climacteric paranoia. A second characteristic of climacteric insanity is, according to Garat, the marked development of jealous emotions and delusions.

In addition to these fully developed psychoses, there occur in degenerates at the climacteric age paroxysms of impulsive insanity in the form of dipsomania, kleptomania, pyromania; exhibitionism; irresistible impulse to suicide, homicide, infanticide, etc. Such paroxysmal impulsive manifestations are, according to Kowalewski, commonly associated with menstrual disturbances; they occur most frequently at the due dates of menstruation when the flow fails to appear.

One hundred and sixty-nine cases of climacteric psychosis were classified by Matusch as follows:

Melancholia	36 cases
Mania	2 cases
Melancholia passing on into paranoia	28 cases
Melancholia passing on into secondary dementia.....	17 cases
Paranoia	43 cases
Neurasthenia during the climacteric period followed by mental disorder	19 cases
Neurasthenia prior to the climacteric period, followed by mental disorder during the climacteric period	10 cases
Apoplexy, cerebral abscess, dementia.....	6 cases
Epilepsy	2 cases
Alternating insanity	3 cases
Paralytic dementia	5 cases

Von Krafft-Ebing classified 60 cases of climacteric psychosis as follows:

Melancholia	4 cases
Alternating insanity	1 case
Acute delirium	1 case
Primary insanity:	
a. With primordial delirium	36 cases
b. Paralytic dementia.....	12 cases

The prognosis in cases of climacteric psychosis is regarded by Kowalewski as unfavorable; unfavorable vital conditions are associated with retrogressive metamorphosis of the tissues, hence mental disorder arising at this time of life is hardly less serious than that due to actual degeneration of cerebral tissues. Indeed, according to Schüler, there is during the climacteric period an especial danger of the development of atrophic cerebral processes (*Encephalitis atheromatosa*) with apoplectic and epileptic seizures. Schläger also regards the prognosis of climacteric insanity as unfavorable; but Merson, on the other hand, observed among women suffering from climacteric psychoses a recovery rate of over 50 per cent. On previously existent psychoses in women, the onset of the climacteric exercises in most cases an unfavorable influence, and very exceptionally only at this time do we observe the cure or remission of a chronic mental disorder to occur. Kowalewski has seen cases of chronic mania in which a cure was obtained at the climacteric period; a somewhat excessive excitability and inclination to violence remained, however, as vestiges of the former insanity. Matusch, keeping under observation 60 women affected with chronic mental disorder as they attained the climacteric period, noticed that in 14 instances the mental condition changed for the worse at this period, whilst in 13 the character of the mental disease under-

went a change, excitement giving place to apathy and dementia. Griesinger had earlier pointed out that at the time of the cessation of menstruation there would occasionally occur amelioration, and even cure, of a previously existing chronic mental disorder; more often, however, the influence of the menopause was an unfavorable one, a hitherto changeable and irritative form of mental disease becoming transformed into chronic insanity with inalterable delusions, or into dementia. The course of mental disorder, such as melancholia, first making its appearance at the climacteric epoch, was also regarded by Griesinger as likely to be unfavorable.

HYGIENE DURING THE MENOPAUSE

During the critical years of a woman's life it is the aim of hygiene to employ all the means available to counteract the changes in the circulation of the blood, the disturbances in the working of the nervous system, and the nutritive disorders, which are in various ways dependent upon the changes occurring in the reproductive organs during the climacteric period; its endeavor should be so to regulate the conduct of life in this epoch that the important episode of the gradual decline and ultimate extinction of sexual productivity shall be effected with as few local troubles as possible, and as slight variations in the general condition.

By means of baths of various temperature, duration, mode of application, and composition, and by other selected hydrotherapeutic procedures, we are enabled during the disturbances of the menopause to exert upon the skin a powerful derivative influence, and in this way to diminish the passive hyperæmia of the uterus and the uterine annexa; by the same means we can exercise a sedative influence on the peripheral nerves

and thus further upon the entire nervous system, whenever such measures are called for by the manifold indications of increased irritability; further, by the use of baths we can influence the circulation of the blood, we can increase the sudatory activity of the skin, and in various additional ways we can affect heat production and metabolism, thus modifying the processes occurring in the reproductive organs, making the conditions favorable for the absorption of exudations, and promoting a healthy tissue-change in the mucous membrane of the genital passages.

In climacteric women, the most usual indications are for the employment of water-baths at an indifferent temperature, 35° to 37° C. (95° to 98° F.), of moderate duration, 15 to 20 minutes, the bath being one of simple immersion, not of douche or affusion, and the temperature being kept constant by continuous inflow of a sufficient quantity of hot water. Such baths as these promote in a mild but continuously efficient manner the functions of the skin—so important during the climacteric epoch; and they lessen the almost constant tendency to perspirations and to the development of diseases of the skin (the commonest of which is climacteric eczema). The moderate degree of thermic stimulus exercised by baths at such an indifferent temperature leads them to have an equable sedative effect upon the nervous system, which is probably dependent upon an influence exerted through the intermediation of the sensory nerve-terminals in the skin; and this is most beneficial in lessening the increased general irritability, both spontaneous and reflex, so commonly manifested by the nervous system at the climacteric period. In women at this time of life, such baths are most useful in allaying the common cutaneous hyperæsthesias and neuralgias, and have a reflex in-

fluence also upon the visceral neuralgias and psychical hyperæsthesias.

In climacteric women suffering from abnormal sensitiveness to sensory impressions, to strong light and loud noises, or from painful sensations in the most diverse nerve areas; in those subject to palpitation of the heart after some trivial exciting cause; in those affected with cramp-like seizures in the pharynx, the œsophagus, the stomach, and the intestinal tract; in women with distressing sensations of itching and burning in the reproductive organs, or in those in whom there is a great increase in the intensity of the sexual impulse—in all these common disturbances of the menopause, by the daily use of such immersion baths of water at an indifferent temperature, best taken immediately before retiring to rest, we shall often succeed in inducing both local and general repose, in diminishing the spontaneous and reflex irritability of the nervous system, and in inducing quiet and restorative sleep.

In other cases of disturbances of health during the climacteric period, however, more benefit may be derived from hot immersion baths, taken at a temperature well above blood heat (37° C.— 98.4° F.), and lasting longer than the warm baths just described. These are indicated when we wish to increase the activity of the circulation through the skin, to give rise to hyperæmia of the superficial structures of the body, to stimulate powerfully the cutaneous nerves, to promote cutaneous perspiration—in short, to exercise a powerful derivative effect, to promote resorption, and to accelerate the general processes of tissue-change. This method of treatment is suitable for cases in which at the commencement of the menopause there are already pathological conditions of the reproductive organs, the morbid states being now aggravated by the processes of the climacteric—

such conditions are metritis and endometritis, chronic inflammations of the intra-pelvic connective tissue and of the pelvic peritoneum; and one of the first aims of treatment must be to promote the softening and subsequent absorption of these inflammatory products.

In cases in which the climacteric troubles, dependent in part on increased general arterial blood-pressure, manifest themselves chiefly in the form of active congestions, fugitive heats, vertigo, etc., the employment of hot baths is likely to be most useful by leading to a notable enlargement of the cutaneous capillary blood-vessels and consequent lowering of arterial blood-pressure. Further, in cases of compensatory fluxes, periodic diarrhœas, periodic leucorrhœa, following the suppression of the menstrual flow, in cases of vicarious hæmorrhage (especially periodic epistaxis and periodical hæmorrhoidal bleedings), the use of hot baths is often competent to restore the functional activity of the ovaries when this has undergone *premature* cessation. In addition, their use assists us in our endeavors to counteract excessive obesity and gouty disorders, diseases which tend especially to make their appearance in women at the epoch of the menopause, disorders of metabolism intimately associated with the disturbances of the uterine and ovarian functions characteristic of the change of life.

In all the conditions just enumerated, if we desire a still more powerful influence than that exerted by ordinary hot baths, it is in our power to employ hot mineral water baths, by means of which a chemical, and perhaps also an electrical, stimulation of the cutaneous nerves is superadded to the simple thermic stimulus conveyed by the hot water. The different effects of the various mineral baths depends upon both the saline and the gaseous constituents of the different

springs, and upon the peculiar physical properties of the mineral waters.

Sudorific baths are of various kinds. Some, Russian baths, consist of hot air saturated with moisture; others, Roman-Irish baths, consist of dry hot air; the most recent of all are the electric light baths, in which the radiant heat of electric lamps is utilized. But owing to the great increase in the body temperature which they cause, with consequent increased frequency of pulse and breathing, and still more on account of the rapid and extensive increase in blood-pressure to which they give rise, these powerful sudorific baths are rarely suitable for climacteric women, and if used at all in such cases the greatest caution must be employed. Their use is indicated only in women in whom at the time of the menopause the rapid onset of obesity has given rise to serious troubles, but in whom the heart is perfectly sound and in whom the blood vessels show no trace of sclerosis.

Far less often than warm or hot baths, or mineral water baths, are cold baths employed during the climacteric period, for baths at a temperature considerably below the indifferent point, and other hydrotherapeutic procedures in which cold water is used, stimulate the nervous system so powerfully and give rise to so great an increase in blood-pressure, that their use is generally to be avoided in climacteric women, since, indeed, it is apt to entail serious dangers, both physical and mental. Immersion baths, plunge baths, or sponge baths, in which the water employed is at a temperature of 18° C. (64° F.) or less, are contraindicated, for they act too energetically, abstract heat too powerfully, to be safely employed at this epoch of life. If we seek by means of hydrotherapeutic measures to counteract states of congestion at the time of the menopause, and

at the same time to bring about a general invigoration of the patient's nervous system, immersion baths, the water of which is not below 20° C. (68° F.), and lasting from five to fifteen minutes, would appear to be indicated. In the majority of such cases, however, a somewhat higher temperature is preferable, from 26° to 28° C. (79° to 82° F.), the patient lying at full length in the bath, immersed to above the shoulders, and the water not being agitated except by a moderate rubbing of the surface of the body whilst the patient is in the bath. When, however, the patient sits in the bath, the water covering only the lower half of the body as high as the navel, a somewhat lower temperature is permissible, 20° to 25° C. (68° to 77° F.); but the duration should not exceed five minutes, moderate mechanical manipulations being carried out meanwhile; such baths appear to reduce nervous irritability and to have a sedative effect in the manifold nervous disturbances of the climacteric period. Sitz-baths, again, of a longer duration, twenty to sixty minutes, the water reaching only to the navel, and being at a temperature varying from 16° to 25° C. (60° to 77° F.), are useful in relieving chronic inflammatory states of the reproductive organs and the associated erotic states and abdominal pain and irritability. Colder sitz-baths, even of brief duration, should, on the other hand, be avoided. Similarly, a shower-bath of water at a temperature of 18° to 24° C. (64° to 75° F.), lasting one to two minutes, and the water falling only from a very slight elevation above the head, have a valuable sedative action; but, on the other hand, a colder shower-bath, of water falling from a greater height, has an exciting action, and is to be avoided at this time of life. When there are severe congestive symptoms, friction of the hands and feet for a short

time with water at a temperature from 12° to 17° C. (54° to 63° F.), followed by a quarter of an hour's rest in bed, may be recommended; also immersion of the feet for a minute in water at a temperature of 10° C. (50° F.), the feet being vigorously rubbed the while, followed by a walk in the open air for five or ten minutes. In cases of sleeplessness at the menopause due to congestion, a useful method is to dip the feet for twenty or thirty seconds in water at a temperature of 8° to 10° C. (46° to 50° F.), the feet being briskly rubbed whilst in the water, or moved rapidly up and down with treading movements; after withdrawal, they are quickly dried, and the patient immediately goes to bed. Another useful mild soporific measure is to apply before going to bed bandages wrung out of cold water; these reach from the foot to the knee, and are left on for the whole night. In cases of climacteric menorrhagia, a vaginal refrigerator should be used for the direct application of cold to the reproductive organs; this is a cylindrical apparatus introduced into the vagina, cold water flows through the interior of the apparatus without wetting the vaginal mucous membrane. This cooling apparatus is useful also in troublesome cases of genital pruritus; cold douches to the vulva for one or two minutes at a time are likewise valuable in the relief of this affection.

For climacteric women, cold sea-bathing is as little to be recommended as other cold hydrotherapeutic measures, owing to its powerful refrigerative effect, and the great mechanical influence of the moving water in the waves. But in certain cases, in which sea-air is likely to be beneficial, lukewarm sea-baths may also be recommended; their effect is similar to that of weak brine-baths at a similar temperature.

During the climacteric period, especial attention

must be paid to the care of the skin. Owing to the extreme sensitiveness of the skin at this time of life to outward noxious influences, it is necessary to exercise great care to dry the skin very thoroughly after ordinary ablutions of the face and hands; irritating soaps should be avoided, and a bland powder should be applied after drying. During the earlier part of the climacteric period, when menstruation has already ceased, and senile changes in the skin with atrophy of the subcutaneous tissues have commenced, the extreme dryness of the skin may be relieved by lukewarm baths with wet packs to follow; after the bath, the woman is enveloped in moist linen cloths and then covered over all with a blanket. When the skin chaps readily,unction of lanolin ointment will be found useful.

Cleanliness of the genital organs, at all times of importance, is doubly so during the climacteric period, for the reason that neglect in this respect is apt to lead to the onset of genital pruritus. Not only after defecation, but after each act of urination as well, the external genital organs and the anus should be carefully washed over with a pad of clean absorbent wool moistened with lukewarm water. After the washing, either powder or ointment should be applied, the former in cases in which the skin of the parts is usually damp from a natural tendency to excessive secretion, the latter in cases in which the skin is dry and tends to crack.

Bodily exercise, carefully selected and regulated to suit the individuality of each patient, is a powerful means of relieving the disturbances of the menopause. Regular and methodical bodily exercise—to which, it must be remembered, women at the climacteric period commonly feel considerable aversion—manifests its good effects in the form of improvement in the nutri-

tive conditions and functional activity of all the organs, and increased activity of all metabolic changes, which are commonly sluggish in women at the change of life. Moreover, muscular exercise, by increasing the volume of blood passing through the muscles, has a beneficial derivative influence in diminishing the congestion of the brain and the other troublesome congestive symptoms which are liable to occur in women during the menopause. Again, in cases of excessive obesity such as so commonly occur in women at the change of life, the increased combustion of fat promoted by regular muscular exercise, cannot fail to have a beneficial effect. Finally, suitably selected muscular exercise has a favorable influence also upon the nervous system, the functional activity of which it facilitates, while at the same time it strengthens the powers of the will.

It is therefore of importance that at the time of the menopause women should continue to undertake appropriate active exercise, regular daily walks, which should include walking up a moderate incline. As a preparation for such exercise (in persons hitherto unaccustomed to walk much), or in bad weather, or, again, when there are special reasons against open-air exercise, and finally as a supplementary exercise to walking, gymnastics and massage may be employed. Such gymnastic procedures are to be chosen as will serve to deplete the vessels of the head, will have a favorable influence upon the portal circulation, and will withdraw the blood-stream from the pelvic organs; such are, in addition to general gymnastic exercises, methodical deep breathing, methodical exercise of the abdominal muscles, exercises involving the extensors of the back and the abductors and external rotators of the thigh, and exercises of the extremities. Various gymnastic apparatus may be employed with advantage,

and more especially those in which the various muscular movements are effected against a resistance. But in all cases extreme care must be taken to avoid over-fatigue and overexertion. A graduated form of bodily exercise combined with passive gymnastics, suitable for climacteric women, is massage, in which by mechanical stimulation, by pressure and friction of the whole body or of certain parts, the nutrition of the muscles is favorably influenced, and the activity of the general circulation is increased. In the use of massage also, in climacteric women, all undue excitation of the nervous system is to be carefully avoided, a mild form of this powerful agent must alone be employed; gentle stretching and rubbing of the skin of the lower extremities, the back, and the abdomen, followed by gentle kneading of the muscles. Massage of the internal reproductive organ (the method of Thure Brandt), in view of the common tendency to sexual excitability in women at the climacteric, is mentioned only to be prohibited. For the same reason, and also on account of the frequency with which at the time of the menopause women suffer from tachycardia and from other disorders of the heart, bicycling is in most cases an unsuitable exercise at this time of life.

A matter of great importance is the regulation of the diet of women during this phase of life, the aim of such regulation being one which the older physicians sought to fulfil by means of venesection and wet cupping, namely, to overcome the abnormality in the constitution of the blood which arises from the cessation of the internal secretion of the ovaries, and further to relieve the symptom-complex of abdominal plethora and the various passive hyperæmias and collateral congestions; and in addition to subdue the great general nervous irritability, the sensibility to external stimuli,

the inclination to excessive reflex manifestations, characteristic in women during the climacteric period.

The diet must be regulated in respect both of quality and quantity, and it is obvious that the regulation must be thoughtfully adapted to the needs of each individual case.

'As regards quantity, the main general principle of dietetics for climacteric women is that overnutrition is to be avoided, that the quantity of nutriment must be reduced to the absolute minimum necessary to supply the needs of the tissues. In view of the fact that we are concerned with women at a comparatively advanced period of life, whose physical labors are not, as a rule, exhausting, that quantity of food will usually be sufficient which is competent to furnish 35 to 40 calories per body-kilogram per diem. If we assume that the mean body-weight of a woman at the climacteric age is 60 kilograms, the heat-equivalent of the food required daily by such a woman may be estimated at 2,100 to 2,400 calories. This will be approximately supplied by a diet consisting of 100 grams albumin, 60 grams fat, and 350 grams carbohydrate. The customary preference for a large amount of nitrogenous food is, however, not dependent upon physiological requirements, and provided that the needful minimum of albumin is supplied (about 1.5 grams per body-kilogram per diem), the requisite number of calories may be furnished by very various combinations of the different nutritive elements.'

The general principles of the qualitative regulation of the diet of climacteric women are: first, that after the necessary minimum of albumin has been supplied, there shall be added an amount of carbohydrate and of fat varying in relative proportions and quantities according to the physiological requirements of the in-

dividual, but taken together sufficient to supply the necessary heat-equivalent; secondly, that there should be an abundant consumption of water; thirdly, that stimulating dietetic adjuvants should, as far as possible, be avoided.

The nitrogenous equilibrium of the body may be maintained either by animal or by vegetable proteids; in the case of the former (animal albumins), the climacteric woman should avoid those containing considerable quantities of nucleo-albumin or of deleterious products of tissue-change; in the case of the latter (vegetable albumins), she should avoid those likely to cause undue stimulation of the intestinal tract. Of flesh foods (mammals, birds, and fishes), those kinds are to be preferred which contain small quantities only of extractives (kreatin, xanthin, etc.), since these substances are supposed to have a stimulating influence upon the nerves and the heart. Hence, boiled meat is better than roasted, and the flesh of young animals (veal, for instance) and fish are to be preferred to game, and the last-mentioned is to be avoided especially for this reason, that the flavors for which it is valued by the gourmet are products of partial decomposition arising from prolonged hanging; for similar reasons, meat extracts, animal soups, sausages, smoked flesh and fish, and preserved (potted) meats, should all be avoided. From the intimate connection between the ingestion of nuclein and the formation of uric acid, albumins rich in nuclein are to be forbidden; such are the various foods consisting chiefly of gland-cells—sweatbread, liver, brain, kidneys, etc. As well as from the appropriate flesh-foods, the requisite albumin may most suitably be obtained from eggs and milk (including buttermilk); on the other hand, caviare is unsuitable owing to its stimulant action on the genital organs,

cheese because it contains large quantities of the products of decomposition of casein and milk-fat; the fermented milks, koumiss and kefir, are likewise unsuitable. Suitable vegetable foods for the supply of albumin (in addition to carbohydrates) are porridge, bread, and the leguminosæ; nuts, on the other hand, cause too much irritation of the stomach and intestines.

For women during the climacteric period we recommend a mixed diet moderate in quantity; the amount of flesh and fat in the diet should not be large, whilst cereals, green vegetables, and fruit may be taken in greater abundance; irritant vegetable foods must be avoided, and especially those which tend to stimulate unduly intestinal muscular activity and intestinal secretion. It is important that an abundance of water should be taken, not less than two or three pints daily, and a pure, fresh, spring water is preferable to the aërated waters, natural or artificial. Alcoholic beverages are to be avoided, and more especially those which are rich in extractives as well as in alcohol. For this latter reason, beer and champagne are harmful, whilst spirits and liquors are to be condemned on account of the high percentage of alcohol they contain. The stimulating alkaloidal drinks, tea and coffee, are also to be avoided, or if taken at all, only in a very dilute form. With regard to the preparation of the food, the cardinal principle is that it should be as little irritant as possible; neither mechanically irritating the alimentary tract by an excess of indigestible or undigested residue, nor irritating it chemically by an excessive admixture of sugar, salt, vinegar, pepper and other spices; nor, finally, giving rise to thermal irritation by being excessively hot or extremely cold.

The individual meals are preferably small ones and they must therefore be taken at comparatively short in-

tervals, five times daily, the principal meal being taken at one or two o'clock in the afternoon, and the supper (which should be small) comparatively early, at seven or eight o'clock.¹

Suitable articles of food are the following:

Soups, Broths, and other Liquid Foods: Soups and broths made from the flesh or bones of beef, mutton, veal, chicken, or pigeon, *without* the addition of meat extract, or of meat juices, peptones, somatose or nutrose, but *with* the addition of barley, oatmeal, rice, wheatmeal, ryemeal, peas, beans, lentils, vermicelli, or macaroni; also broths or porridge made from any kind of ground cereal, or from potatoes, or from peas, beans or lentils.

Flesh Foods: Lean beef, veal, mutton, roast or boiled, pigeon, chicken; certain fresh fish—pike, haddock, sole, perch, and trout. *Unsuitable* are: pork, goose, eels, salmon, herrings, oysters, caviare, lobster, crab, smoked meat, hare, venison, wild-duck, brain, liver, kidneys.

Vegetables, Sweets and Savories: Green peas, spinach, cauliflower, carrots, turnips, buttered eggs, omelette, boiled and baked puddings, rice boiled in milk, apples and rice, whipped cream, salads, wheaten bread, French rolls, biscuits, and rusks.

Fruits: Almost all fruits may be taken, raw, cooked, or preserved; also in the form of currant and other fruit cakes, and as fruit-ices.

Beverages: Milk, buttermilk, water, the same acidulated with various fruit-juices and essences (as lemon-

¹ In his discussion of the details of diet for women during the climacteric period, hours of meals, actual dishes, etc., the author refers exclusively to Austrian and German customs in these matters. The translator has not attempted to adapt the following pages to the needs of English readers, as he feels that the general principles already given will enable the English medical man to construct without serious difficulty suitable diet-tables for the cases with which he has to deal.

ade, etc.), weak tea with plenty of milk, cocoa, chocolate. To be *forbidden* are: beer, strong and sweet wines, distilled spirits.

An example is subjoined of a simple diet-table compiled on the above principles:

	<i>Quantity in grains.</i>	<i>Albumin.</i>	<i>Fat.</i>	<i>Carbo- hydrate.</i>
AFTERNOON:				
A cup of milk.....	150	5.4	5.4	7.5
Roll and butter.....	70	4.9	0.4	39.2
MIDDLE OF MORNING:				
Soup	100	1.1	1.5	5.7
Roll	70	4.9	0.4	39.2
MID-DAY MEAL:				
Soup	100	1.1	1.5	5.7
Roast meat	100	38.2	1.7	....
Green vegetables.....	100	1.6	0.4	8.4
Pudding	200	17.4	30.0	57.8
Fruit	100	3.0	....	15.0
Bread	35	2.4	0.2	19.0
BREAKFAST:				
A cup of milk.....	150	5.4	5.4	7.5
Roll	70	4.9	0.4	39.2
SUPPER:				
Soup	100	1.1	1.5	5.7
Two soft eggs.....	90	11.2	10.8	0.4
Bread	70	4.9	0.4	39.2
Fruit	100	3.0	....	15.0
Total	1,617	110.5	69.9	304.5

In addition, water, *ad libitum*, and perhaps a little light wine.

In many cases, however, a mainly vegetarian diet may be more suitable, and more particularly a mainly fruit diet, in order to diminish persistent congestive

symptoms. In such cases the following diet-table may be recommended for *short* periods:

First breakfast: An apple and an orange.

Second breakfast: 25 grams of white bread with butter and three baked apples.

Dinner (mid-day): 100 grams fish or meat, potatoes, green vegetables, three boiled or baked apples.

Afternoon: An orange, or an apple, or a pear, or some grapes.

Supper: Milk, apples and rice, oranges, grapes, figs.

Beverages: Water, with or without fruit juices or essences.

Changes in the above diet-table could very readily be effected, whereby the quantity of carbohydrate could be increased and the quantity of albumin lessened.

In women of sanguine temperament and full habit of body, who at the time of the menopause very rapidly become obese, important changes in the diet become necessary. The main principles of a fat-reducing diet are the following: Avoidance of all overfeeding, reduction of the quantity of food taken below the former average amount, with retention, however, of a sufficiency of nutrient material to maintain the metabolic equilibrium of the essential tissues; the maintenance of this metabolic equilibrium demands a sufficiency of nitrogenous foods, but the fats in the diet may be reduced to a minimum, and the carbohydrates may also be very greatly diminished. At the same time, there must be systematic bodily exercise, and the hours of sleep must not exceed a nightly average of seven.

For obese women at the climacteric period, a suitable average diet would contain 160 grams albumin, 12 grams fat, and 120 grams carbohydrate, yielding a daily heat-equivalent of 1,250 to 1,300 calories.

'A sample diet-table constructed on these principles is appended:

	<i>Quantity in grains.</i>	<i>Albumin.</i>	<i>Fat.</i>	<i>Carbo- hydrate.</i>
BREAKFAST:				
A cup of weak tea.... with milk, but no sugar	150	0.45	....	0.9
White bread	50	4.8	0.4	30.0
Lean cold meat	50	19.1	0.9	....
DINNER (Mid-Day):				
Small cup of clear soup	100	1.1	1.5	5.7
Lean beef	200	76.4	3.4	....
Green vegetables, salad, etc.	100	1.6	0.4	8.4
Fruit	100	3.0	....	15.0
Roll	35	2.4	0.2	19.6
AFTERNOON:				
A cup of weak tea.... with milk, but no sugar	150	0.45	....	0.9
	30	1.29	0.9	1.2
SUPPER:				
Soup	100	1.1	1.5	5.7
Lean roast meat	100	38.2	1.7	....
Roll	50	4.8	0.4	30.0
Total	1,245	155.9	13.2	118.6

In the selection of individual articles of diet, it is important to bear in mind the fact that in all climacteric women it must be our aim to stimulate intestinal muscular activity (peristalsis) and intestinal secretion to a moderate extent, for by more active intestinal secretion abdominal congestion is to some extent relieved, and by intestinal transudation and by diminution of the lateral pressure the circulation through the abdominal vessels is facilitated. By thus lowering the intra-abdominal blood-pressure, we shall

assist in relieving a number of chronic hyperæmic states of the pelvic and various other organs, from which women are prone to suffer at the menopause. Hence all articles of diet must be forbidden which have a tendency to give rise to constipation. But we must also forbid all substances which leave extensive undigested residues, such as the rinds of fruits, large quantities of porridge, etc., hard meats, nuts, and the like.

Most suitable are those articles of diet which contain large percentages of fluid constituents, such as milk, thin soups, weak tea (infused only a short time, so as to contain little tannic acid, which is very constipating), white meat—veal, breast of chicken, etc. Of vegetables, those are best which contain plenty of water and an abundance of the organic acids, young, fresh garden produce, lettuce, cauliflower, young green peas, young carrots, turnips, etc. Juicy fruits are good, apples, pears, cherries, and plums. Butter and honey are also excellent. In many persons suffering from constipation, all that is necessary for their relief is to give a tumblerful of cold water the first thing in the morning; with others, the use in addition of whole-meal bread with plenty of butter and honey and uncooked fruit, is required.

In women suffering from the various disturbances of the climacteric period in an aggravated form, either because the menopause occurs at an unusually early age, or because the suppression of menstruation has taken place suddenly instead of gradually—especially in cases of heart-trouble, severe vertigo, pronounced vasomotor disturbances, or mental excitement (also erotic excitement), I have sometimes found a methodical milk-cure carried on for several weeks most beneficial. By this I do not mean an exclusive diet of

milk, but a diet consisting chiefly of milk and milk-foods. Owing to the absence of all irritation of the nervous and vascular systems, this diet has a very definite sedative influence in such cases. The milk should be skimmed, and should be given four times daily in gradually increasing quantities, the total amount rising from ten ounces to fifty ounces daily. The only other meal should be a substantial midday dinner, consisting of soup, roasted white meat, young green vegetables, and a little fruit. In some instances, to prevent constipation, it is necessary to add ten grams of milk sugar to each glass of milk; in other cases it is necessary to dilute the milk with water. It is obvious that the quantity of milk given is not alone sufficient to maintain the metabolic equilibrium of the body; but the defect in this respect is made up by the substantial meal given at mid-day.

Among the stimulating influences which during the sexual epoch of the menopause are as far as possible to be avoided we must unhesitatingly include the practice of coitus, inasmuch as at this time of life there already exists a strong tendency toward occurrence of hyperæmia of the reproductive organs; and sexual intercourse, increasing as it inevitably must this tendency to hyperæmia, should be indulged in as little as possible. And yet precisely in women of the climacteric age, in "*la femme demi-vieille*" there often exists a strong desire to drain the cup of sexual pleasure to its dregs. Not infrequently, therefore, the physician is asked to advise regarding the proposed marriage of a woman in whom the menopause is drawing near, the desired husband being young, or at least still fully virile. If the advice is given in all sincerity with a sole eye to the woman's health, the medical man will definitely forbid the marriage.

When, however, the changes of the menopause are fully completed, when the woman's reproductive organs have undergone complete senile atrophy, there is no medical reason why a couple who wish to give a tenderer name to an intimate friendship between man and woman, should refrain from marriage—provided that both have attained a like stage of sexual decline. "But," writes Tilt, "a union between frosty January and blooming May is likely to be as dangerous to the health as it is to the happiness of both."

Whilst attending to the regulation of the physical diet of his climacteric patient, the physician should not overlook her psychical regimen. A woman's mind is very powerfully affected by the processes of the menopause. On the one hand, her fears are stimulated by the thought that she is entering upon the "critical age," of whose dangers she has often been warned; and, on the other hand, she is mentally depressed by the knowledge that she is about to lose the charms of womanhood, and to decline in sexual esteem. It is well, therefore, for women during the years of change to have some kind of employment, which fills their hours, occupies their thoughts, and—leaves a certain scope for the exercise of feminine vanity. Works of benevolence or of general utility, and literary occupation, are thus of great advantage to climacteric women. Plato, indeed, pointed out that women at this time of their lives should occupy themselves with literature and intellectual culture.

Just as it is the duty of the physician, more especially of the family physician, to enlighten the maiden on the threshold of her sexual development regarding the processes of the awakening sexual life, and to give her the necessary instruction concerning the hygienic measures which it is proper for her to adopt—so also

is it his duty to convey medical information to the woman who stands on the threshold of sexual decadence. A woman's ignorance is often equally profound at both these epochs of the sexual life. A woman in the early forties often does not suspect, or at least refuses to acknowledge, that she is gradually drawing near to the end of her sexual life; and she is still farther from the knowledge that definite rules of general and sexual hygiene must be observed by her if she wishes to minimize the dangers of the critical period.

The medical friend, in an earnest though far from gloomy manner, will expound to her the nature of the physiological processes of the menopause, and will instruct her regarding the corresponding preventive measures—diet, exercise, clothing, care of the skin, and the regulation of sexual intercourse. Moreover, the physician, by means of skilfully directed inquiries regarding certain symptoms, will be enabled to gain early information about the occurrence of abnormal processes at this period of life, and will in this way detect the first beginnings of many diseases which are amenable to treatment only at the very outset of their course. For example, Brierre de Boismont, an early and accurate observer of this sexual epoch in the life of woman, points out that in cases in which, during the change of life, a woman experiences an increased inclination for sexual intercourse, nineteen times out of twenty a local examination will disclose the existence of some disease of the reproductive apparatus. Similarly, every gynecologist is now familiar with the fact that unusually free, atypical haemorrhages during the climacteric period, are commonly indications of the existence of a uterine neoplasm.

Much evil may be avoided, and much suffering can

be diminished if the physician, in accordance with the advice of Hippocrates, does not limit his activities strictly to the exercise of the healing art, but stands by a woman's side as her mentor and confidant during the troublesome years of her sexual decline.

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